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EDITORIAL.

AN INTERESTING REPORT comes from California, to the effect that the Mountain Copper Company is about to commence the manufacture of sulphuric acid from its ores. The company has had trouble over the sulphur fumes from the smelters; in fact, there has been an injunction hanging over its head for years. The ores are rich in sulphur, so that with a local demand for sulphuric acid, it would not only bring an additional source of income, but would remove their worry over the fume question. It is probable also that the company will manufacture artificial manures. The Iron Mountain mine continues to yield high-grade copper ore, but its life is known to be limited. The Hornet pyrite deposit contains comparatively little copper, but would be valuable for acid making, and the copper in the residues could be leached out.

RATHER LURID REPORTS were cabled to New York last week, describing an "international steel conference," said to be in session in London. This conference, according to report, included representatives of American, British, German and Belgian steel interests; its object being to fix uniform prices for all competitive markets, and to apportion steel exports among the manufacturers of the different producing countries. Curiously, prominent British steelmen knew nothing about this conference, and disowned it entirely. The despatch seems to have been pure fiction, or else based on very insufficient grounds. That there might be negotiations between the United States Steel Corporation and the German Steel Syndicate is possible; that British and Belgian interests should join, is inherently improbable.

IN THE latest report of the Tennessee Copper Company, an abstract of which was published in the JOURNAL for March 3 last, the statement was made that the company had decided to abandon heap-roasting its pyritic ores, and to smelt green, or raw, ores hereafter. The change is now being made, and work at the mines was stopped on April 1; they will remain idle until the ore now in the roast-heaps, over 100,000 tons, has been smelted. Mining will be resumed in time to supply the furnaces with

raw ore when it is required; probably in a few weeks. This change will finally dispose of the suits brought to restrain the company from operating, on account of the damage done by the sulphurous fumes from the roast-heaps. These proceedings were dismissed in the Tennessee courts, but a suit brought on behalf of residents in Georgia, near the Tennessee line, has been carried through the Federal courts, up to the Supreme Court. This will now be dismissed, and it is understood that no further proceedings will be taken. The company has three new smelting furnaces under construction, and by July will probably have six furnaces in blast.

THE GREATER ECONOMY now realized in the preparation of anthracite coal for market is shown by the statement in the report of the Girard Estate, that nearly 50 per cent of the coal shipped last year from the collieries on the estate was of the small, or steam sizes. Only a few years ago this small coal went into the culm-piles; and, indeed, very considerable quantities of small coal are now sent to market, from the working over and washing out of these old waste-heaps. The figures given in the Girard report, moreover, are corroborated by those of such other anthracite reports as are accessible at present. The value of anthracite and the limited extent of the supply are beginning to be realized. Waste in mining and preparation is being reduced, though much still remains to be done.

THE PRODUCTION of zinc ore in the Joplin district during the first quarter of 1904 was 65,500 tons, or at the rate of 262,000 tons per annum, which is a large increase over 1903. The production in the first quarter of 1903 was only 58,381 tons. The average price reported for the output in 1904 is $33.30, which is decidedly high, the average price of spelter at St. Louis having been only 4.673 in January, 4.717 in February, and 4.841 cents in March, wherefore the stimulus to production.

The price for spelter has lately risen, as we forecasted it would be likely to do, and, ore having failed to rise in the same proportion, the smelters gained a somewhat more comfortable margin, which, indeed, they were in need of. The increasing supply of ore, combined with an improved demand for the metal, has put them in this more satisfactory position. The miners are receiving so high a price for their product that they have no ground for complaint. An unusual feature at present in the Joplin ore market is the wide range in basis prices, ore being quoted at $34 to $37 on 60 per cent base, which means that inferior grades are purchased in proportion to $34 for ore containing 60 per cent zinc; and superior grades in proportion to $37, this being due to very active competition for the fancy ore by certain smelters, who prefer that kind.

THE EXTRACT FROM the presidential address of Mr. Eugene Coste to the Canadian Mining Institute, published on another page, indicates the lines on which the organization of a mining bureau for the Dominion is desired. This may be taken as an official expression of the Institute, since it embodies in a concise way the views which were generally expressed in a long debate at its meeting in Montreal last year, and which have since been approved in communications received from many members not then present. Whether an entirely new department shall be formed, or whether the ends desired shall be attained by an enlargement of the power of the Geological Survey, and an increase of its staff, is a matter of detail which is comparatively unimportant.

The Canadian policy towards mining and metallurgical enterprises has been, as a rule, more paternal than our own, as is shown by the bounties offered for iron making, and more recently for lead smelting and refining. By a curious contradiction, the Geological Survey has been hampered and its work restricted by small appropriations. A reversal of this policy, and an increase of the powers of the Survey, and of the means at its disposal, appear at the present time to form the most desirable plan. It has the advantage of a trained and capable staff, and it is better to build on a safe foundation than to start an entirely new structure, with new and untried material. This is only a suggestion; our Canadian friends will work out the problem in their own way, we trust to the greatest benefit of the mining industry.

ENGINEERING BUILDING.

Matters in connection with this enterprise are advancing satisfactorily. A bill incorporating the three national engineering societies which are recipients of Mr. Carnegie's gift has been passed by the State Legislature, and a conference committee has been formed to inaugurate an architectural competition under the professional advice of Mr. W. R. Ware. Six well-known architects have consented to submit plans, and in addition there will be an open competition, the first to be paid for in the usual way and the second to be compensated by four prizes. We understand that excavations for the foundations of the building will start this summer when existing leaseholds expire, and that within two to two and a half years from date it is expected that the building will be ready for tenancy.

While chronicling the good progress being made in a matter which is of general interest to professional men, we desire to proffer the suggestion that the building be known as the Engineering Building or Engineers' Building, and that the word "union" be omitted from the title; it is a word suggestive in England of pauperism and in America of unintelligent tyranny; nor is it accurate, for it is association and not union which is the *raison d'être* of the building to be devoted to the use of the engineering societies.

AN EDUCATIONAL METHOD.

In our discussion department this week there appears a contribution by Mr. James F. Kemp, professor of geology in the Columbia School of Mines, the publication of which gives us particular pleasure. It is a criticism and a correction of some interesting, though heterodox, views on geology expressed in a previous issue by a correspondent who voices many of the vague ideas on geology held, independently of all text books and authority, by men who go down mines in skips and see the wonders underground. We know of no more useful function of authoritative scientific men than this one of discussing the fundamental problems arising from the gathering of observations in the field when they are undergoing the earnest investigation of those who have not the aid of library and laboratory. If this JOURNAL can bring together the practical man and the thinker, the student and the professor, it will have accomplished one of the purposes for which it exists.

Those who spend time in mines do not consider them as dark places, but mentally they often find themselves groping in the dark amid a tangled maze of phenomena, to elucidate which advanced science alone can give adequate light. It is unfortunately a pose among some scientific men to look down upon such efforts after truth, much as a West Point man adopts a supercilious air toward the border volunteers, who have not had the advantage of a military academy; but it is a narrow spirit unworthy of a great cause, and it has been conspicuously absent in the make-up of the famous teachers of science.

We reach at true conclusions only after stumbling over discarded hypotheses. "Error is Truth in the making." The incorrect notions of one man are sifted and shaped by another until they become a crystallized theory; without the raw material of scattered observation and unverified conjecture there would be no progress; we cannot reach finality at a leap, particularly in a study such as that of geology which deals constantly with matters beneath and beyond all possibility of human observation. Therefore we have no sympathy for the self-sufficiency of those who are content only to say the last word, and we express cordial appreciation of the educational work accomplished by such kindly and illuminating comment, as that with which Mr. Kemp honors this JOURNAL at the present time.

PROFESSIONAL RESPONSIBILITY.

The large number of mines now managed in London by the firm of Bewick, Moreing & Co. has been increased by the addition of the Golden Horseshoe Estates, the Great Boulder Perseverance, the South Kalgurli, the Ivanhoe South Extended, the White Feather Main Reefs, and numerous other properties in Australia.

This tendency to place mines under the direction of firms of mining engineers, subordinating the control of the directors to that of the engineering staff, presents a recent development, the success of which will be followed with much interest by members of the profession and by the shareholders in mining companies. We venture to say that it will depend entirely upon the abstention of the engineering management from share speculation. The engineers having charge of such important mines receive large salaries and, we understand, a share of the profits. This is quite proper, and if on the top of this they invest their own capital in mines which their own good management has rendered a safe investment, there is a fitness of things which is a joy to the beholder; but—and here though we tread on delicate ground, we shall tread it firmly—when the control of mines in a professional way becomes mixed with any sort of gambling in shares such as would tempt average human nature to manipulate the monthly production or color the reports on the condition of the mine, then the new system will go the way of others which have preceded it, and skilful engineers will be no more advantageous to the investor than the average of incompetent directorates.

The sooner people get rid of make-believe and recognize that risky speculation undermines moral and professional obligations, the sooner will places of responsibility be relieved of those whose mental attitude unfits them for the exercise of sober judgment. Men who gamble in shares inevitably succumb to the maladies of unscrupulous finance, the first of which is a loss of the sense of duty; it is a weakness of human nature which no amount of good intention can circumvent. These are the lessons taught with weary iteration by the study of company disasters, more especially the wreckage of mines which have passed under the control of careless directors and reckless promoters. It will apply also to professional men when they in their turn lay aside their sense of personal responsibility to take part in a game the rules of which are in no handbook that was ever printed.

We do not hesitate to proffer these remarks, because in the case of the engineering firm whose splendid success has emphasized a new development, there is nothing but honorable conduct to be expected. They have won on merit by inaugurating reforms in the operations of a group of highly profitable West Australian mines which previously had been the victims of the worst forms of company mismanagement. The reduction in costs at such properties as Oroya-Brownhill, Cosmopolitan and Great Fingall appeals to investors with all the dry eloquence of statistics which cannot be controverted, and if the present rate of improvement is maintained the result will be to make the great mines of Kalgoorlie the model for engineering skill throughout the world. It means a new idea of administration with the mining engineer as the main factor, instead of his being an unhappy subordinate to an untechnical committee of directors, whose hands are on the treasury while their eyes are on the market quotations. But the growth of the system, and perhaps its eventual general adoption, will assuredly depend upon the entire severance of share speculation from professional work.

A NEW ANTHRACITE RAILROAD.

It is possible that the purchase of controlling interest in the old Connecticut Western Railway, now the Central New England & Western, by the New York, New Haven & Hartford Company, may make some difference in the transportation of anthracite coal. It is not probable, however, that these changes will be anything like as great as some of our contemporaries seem to imagine. It is true that the New Haven Company has already given notice of the discontinuance of the ferry across the Hudson river from Newburg to Fishkill Landing, which is at present used to connect its Highland Division—the old New York & New England—with the Erie railroad at Newburg, and which transports some anthracite.

The line recently bought by the New York, New Haven & Hartford Company is part of what was known as the Poughkeepsie bridge route, and its possession carries with it the control of the bridge over the Hudson at Poughkeepsie, and the line from the western end of the bridge to Campbell Hall, where it connects with the Lehigh & Hudson River road to Belvidere and Easton, and the anthracite lines centering at the last-named point. This line was built originally to carry coal and other freights from Pennsylvania to western and central New England. On the map, it is almost an ideal line for that traffic, but owing to drawbacks in its construction, to the lack of capital of the companies owning it, and to failure to make satisfactory connections on either end, its traffic has been very small, and its operations on the whole unprofitable. The new owners have sufficient capital and excellent relations with other lines, but whether they will succeed in making it answer the purposes for which it was intended is another matter.

The section acquired by the New Haven Company is that from Hartford to Campbell Hall. The Lehigh & Hudson River road will probably be leased by the New Jersey Central Company, still forming part of the through line.

The portions of New England referred to receive a great part of their anthracite supply by rail from ports on Long Island sound, where the coal is delivered by water. The Poughkeepsie bridge line furnishes a much more direct route—on the map—with the possibility of carrying coal through without handling or trans-shipment. For anthracite the latter is a point of minor importance, but with bituminous coal, of course, the handling is a matter of much greater moment. The drawbacks to this line are the heavy grades which exist on many portions of it, especially about Norfolk and Canaan in Connecticut, just west of the Hudson river in New York, and rising from the Pequest Plains in New Jersey; the rather poor construction of the great part of the line; and the condition of the bridge over the Hudson. The Poughkeepsie bridge, designed over 20 years ago, and built more than 15 years ago, was proportioned for locomotives of that date, and can not safely carry the 100-ton consolidation engines and the 50-ton steel cars which are used in working coal traffic on most roads to-day.

The road might be made an efficient transportation line for coal by the expenditure of a large amount of money in putting down heavier rails, strengthening bridges, reducing grades and improving alignment. It is doubtful whether the saving which could possibly be effected by shipping coal over these lines, as compared with the present routes, would be sufficient to warrant the expenditures. Until this is done we can not look for any considerable effect upon anthracite transportation. In fact, it looks very much as if the New Haven company has purchased the line rather to remove a possibility of competition than for the purpose of utilizing it in the near future. That company, however, has recently been making efforts to secure all-rail coal, and consequently a higher proportion of the freight rates, and may consider the necessary outlays on its new possession a good investment for the future.

MARKET CONDITIONS.

April 27.

The metal markets have been generally quiet during the week, with no important changes in price. In copper, domestic business has been on a moderate scale, but during the last two or three days considerably more inquiry has developed from abroad. In view of the large exports of the past few months, it is evident that consumption in Europe is upon a large scale. Tin shows no changes either in demand or in price. In lead also, there has been no incident during the week, demand continuing fair. Spelter is quiet and unchanged, except for a rather easier tendency. The Joplin ore market remains steady.

Silver shows a somewhat better demand from Eastern buyers, with a resulting moderate advance in prices.

The iron and steel markets again show some hesitation, and, in the case of pig iron, rather lower prices. Consumers seem to be pretty well supplied for the first half of the year, and are not inclined to contract for anything beyond June deliveries, under present conditions. In finished material the market is uneven. The demand for sheets and plates is a little better, but for structural steel it still continues very moderate. The railroad companies are still holding back orders.

The Western coal markets are somewhat disorganized by the late opening of the lake trade. Probably no cargoes will be shipped from Lake Erie ports before May 5.

The Atlantic seaboard bituminous trade shows little change. The supply of coal arriving at tidewater is ample for all demands. The difficulty over charters between shippers and vessel-owners interferes a little with the coastwise movement of coal.

The anthracite trade shows an unusually active retail demand, while wholesale buying will remain brisk for at least a month.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The first gold vein discovered in Colorado was the Gregory, at Black Hawk, Gilpin county, on May 6, 1859. In 1902, 43 years after, the State produced $28,468,700 in gold, which is equivalent to 35.6 per cent of the total for the whole country.

Up to 1860 Russia produced annually only about 30,000 bbl. oil used for fuel and as a coarse lubricant. In 1902 the output was 80,540,045 barrels.

In Japan antimony mining began centuries ago, and to-day the principal mine is situated on the island of Shikoku. The ore is high-grade stibnite, and is smelted on the seacoast at Sanchoba. The method of smelting employed is very simple. A crucible with a small hole bored through its bottom is set upon another crucible. The upper one is filled with powdered ore covered and heated from below, coal being used as fuel. The sulphide of antimony in the ore is melted and drains away from the gangue into the lower crucible, whence it is ladled into molds. Subsequently the sulphide of antimony is reduced to metal and shipped in boxes.

Speaking of antiquated methods of transportation, recalls the "human tram" that once carried sulphur from the top of the extinct crated Popocatepetl, 10,500 ft. above the city of Mexico. An Indian would scrape the sulphur from the floor of the crater, bag it, and seating himself and cargo on a mat placed on the snow, slide swiftly downward; thence he would deliver his burden to the retorts to be purified for shipment to the city of Mexico. Since Americans have acquired the silent volcano, many improvements are contemplated.

A CANADIAN BUREAU OF MINING.*

By Eugene Coste.

There is also another subject of very great importance to the mining interests of this country to which this Institute has wisely devoted considerable time and attention on many occasions and in which, I am very glad to be able to record, our influence has also been the means of effecting substantial advance and progress. I refer to the question of what should the Dominion Government do in aid of mining.

So far the Geological Survey of Canada has been almost the only aid to mining given by the Dominion Government. This Institute has always shown its appreciation of the good work of many prominent members of the Geological Survey, and has even advocated with some success the payment of larger salaries to members of such a technical branch of the service. It has also often recommended larger, better and safer accommodations for the offices of the Survey and for the very valuable collections of its museum, and it is very gratifying to know that this is at last being provided for in an entirely new large building. the ground for which has been acquired by the Government in Ottawa, and the plans of which have been prepared and decided on, and which is to be built immediately. Yet this Institute has felt, and has fairly but firmly expressed during the important and lengthy discussions which took place on this subject during our annual meeting of 1902, that the Geological Survey as then organized and conducted, was entirely unable to cover all the ground which the national importance of mining, and the many important interests served thereby, now need and demand in such a large and rapidly growing country as Canada, so rich in mineral resources of all kinds, and so much of which is yet so entirely new and even unknown that it requires many thorough explorations, surveys and studies. We pointed out that the Geological Survey department in charge of this work had not grown with the country, that it had practically the same appropriation year after year for many years, and, therefore, that it was only natural if it was not keeping pace with the rapid mining and metallurgical developments of this country, and if it was lacking in many of the branches necessary for its complete usefulness; that it needed, therefore, to be reorganized and extended and converted into a 'Department of Mines and Geological Survey.'

At the end of the discussions it was unanimously resolved: "That the Canadian Mining Institute, in annual session assembled, desires to direct the attention of the Federal Government to the magnitude and importance of our mining industry which, during recent years, has developed so rapidly; and respectfully urges an increase of government aid wherever possible, and the establishment of a strong and practical Department of Mines, or of a department which shall be devoted to the interests of the mining and metallurgical industries, and which shall include the Geological Survey and all other necessary branches."

These necessary branches were clearly pointed out during the discussions to be:

1. Administrative branch.
2. Geological Survey, Paleontological and Botanical branch.
3. Geographical and Topographical branch.
4. Mining, Geological Survey and Monograph branch.
5. Statistical, Economic and Commercial Mining branch.
6. Chemical and Metallurgical branch.

I take pleasure in recording that the Dominion Government, through the Minister of the Interior, has been gradually working on the lines of the above resolution and suggestions, and in complimenting the new geographical branch on the excellence of its work newly published, and we have no doubt that the other branches which have newly been or are being, organized will soon be able to make as creditable a showing.

This is the age of specialization, as we all know, and necessarily so, since every branch of science, industry, commerce, or anything else, is getting to be such a vast and complex subject in itself, that the best specialists are often none too good to stand the sharp light and competition of such rapidly advancing progress. Therefore, it is only natural that the conclusions arrived at by members of this Institute, after exhaustive studies and discussions on the subject of 'Government Aid to Mining,' should have been that the work of the department of the Dominion Government specially devoted to the interests of the mining and metallurgical industries of the country should be specialized in different branches, each with as competent a head as it is possible to secure and all under the direction of one of our cabinet ministers; whether this cabinet minister be named Minister of Mines or Minister of the Interior, is a matter of little moment to us as long as the important work under his charge, in which we are vitally interested, is thoroughly and systematically done.

The work of such a department of the Dominion Government, as it was well pointed out during our discussions, would not interfere in the least with the mining rights, and the work in that connection, of our different Provinces, which have under their charge the making and administration of the mining laws of these Provinces; the selling thereby or leasing of the mineral lands; the inspection of the mines for the due protection of the safety of the miners and the prevention of waste; the keeping of proper maps, plans and records of their mines; the collection of dues, licenses, taxes or royalties on the mines of their Provinces; the collection of mineral and metallurgical statistics; the care of helping and fostering technical education; the Provincial assay offices; the making of better roads and other means of transportation in the mining districts; the establishment of custom concentration and reduction works; assistance in deep sinking and in testing deposits by diamond drills and otherwise. Finally, there would be the prompt issue of notes, papers, or bulletins on newly discovered mineral districts in the various provinces and territories of the Dominion.

*Extract from Presidential address delivered at the annual meeting of the Canadian Mining Institute; Toronto, March, 1904.

To overcome the difficulties from blasting in wet holes, tubing made from waterproofed cloth, though somewhat expensive, is an admirable substitute for the rather ancient method of sponging out the holes with tufts of hay, tow, or waste fastened to the end of a cleaning rod. Ready-made tubing is also considered more satisfactory than the home-made waterproof cases of stout brown paper or canvas, which are filled with gunpowder, and then coated with tar or tallow.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of the Engineering and Mining Journal.

ORES FROM IGNEOUS MAGMAS.

The Editor:

Sir.—In the last two months several letters to the Journal have continued the discussion of the interesting question regarding the causes of vein formation. In referring, in a previous communication, to the views which had been still earlier expressed by Mr. Robert Stevenson, the writer did so without fully grasping them, and without being familiar with the field-evidence which had suggested them. Mr. Stevenson has, since then, more fully outlined his conceptions, and has prepared a section of the mountains on the Seward Peninsula, from which certainly it appears that the given conclusions might be readily drawn. The essential point is, that sedimentary rocks might be re-crystallized under the influence of heat and with the addition of waters carrying more or less of alkaline salts in solution. From the influence exerted by heat and water it is believed that a mushy mass would result, capable of re-crystallization, so as to yield rocks like granite, or other igneous types, and at the same time favorable to the emission of vein and ore-forming vapors and solutions. The influx of oceanic waters upon heated but deep-seated sediments, such as limestones, is cited as one possible source of the vein-forming solutions; and the point is made that in this way apparently, but not exactly, *bona fide* igneous masses might originate in place, above some sediments and below others. Apparent igneous rocks may therefore not be intrusive in their nature, even though they seem to lie between stratified rocks.

The metamorphism of sediments in order to yield crystalline rocks is, in a somewhat different form, a time-honored conception in geology. The earlier school of American workers was especially prone to explain in this way the ancient gneisses, many of which shaded into massive granites. Thus, it was a not infrequent experience to meet areas of this rock, well foliated, or gneissoid in the outer portions and massive at the center. The conclusion drawn was that the foliation represented the old bedding planes of sediments not so thoroughly metamorphosed as to destroy this feature; while the center represented the extreme of re-crystallization, all the evidence of stratification having been destroyed.

The process was believed to have been made possible by deep burial, and by the operation of the interior heat of the earth, within whose sphere of influence the sediments were believed to have been brought. The waters essential to the process were supposed to either have been locked up in the sediments at the time of their disposition, or else to have reached them in the interior circulations, about which, it is fair to say, no such definite conceptions had been reached as are held to-day.

These general views involve no great improbabilities, and perhaps have much to commend them. The necessary heat is supplied in a reasonable way, and the waters required might also be present. At the same time, nearly all observers of experience in metamorphic districts would be much more inclined to-day to explain the phenomena as due to the effects of pressure and rock flowage upon a mass of igneous granite, inducing foliation in the borders, but failing to produce it at the center.

It is difficult to conceive of rocks below the surface affected in a localized way by heat, even of moderate amount, except in two ways. One is by the normal increase of the temperature toward the center. Sediments laid down at the surface may, by depression and the accumulation of a constantly increasing load of other sediments, be forced deeper and deeper so that they reach interior zones of somewhat elevated temperature. Underlying strata will, of course, be still hotter—and for all depths which could be reasonably considered we may readily estimate the amount. Thus in round numbers it requires about 10,000 ft. to reach a temperature of 212° F., the boiling point of water at the surface, but of course for this depth and pressure the actual boiling point would be much higher. This general estimate is based upon an assumption of about 50° F. for a mean annual temperature at the surface, and an increase of 1° F. for each 60 ft. of descent.

It is evident that from this source of heat no great temperature can be attained for a very long distance, and that even if a flood of sea water could be introduced through several fissures to the rather extreme depth of 10,000 ft., it would operate only to greatly chill rocks at 212° F. We cannot readily conceive of them becoming semi-fused, or mushy and plastic.

The only other source of localized heat is an intrusion of igneous rock, which, rising from reservoirs of molten material below, may come to rest at any assumed depth below the surface. No doubt it would contribute some of its heat to the neighboring country rock so far as it was able, rocks being poor conductors, and that thus temperatures would be reached for a short distance outward, which would be fairly high, and which would enable active reactions to take place, were large quantities of water to be introduced. But on this supposition we must not forget that we have igneous rock at the outset as an essential factor; that this igneous rock is abundantly capable of stimulating circulations of normal groundwaters, of contributing its own quota of dissolved vapors, and of accomplishing the desired vein formation, without the introduction of extraordinary, and somewhat improbable, masses of water from the surface. We thus come back to the igneous rocks of normal type, upon which so much vein formation seems to depend.

I think that most readers will find it extremely difficult to conceive of any explanation for bodies of rock, which occur in a stratified series, and which have the mineralogy and textures of normal igneous rocks, except the one of igneous intrusion from molten reservoirs below. If introduced in this way they may, of course, have coal seams or any other sedimentary rock under, as well as over, them. A knowledge of the local geological section would then be necessary in order to draw an inference, and the section and its structural relations ought to be worked out, before concluding what lies over, or under, a sheet of eruptive.

J. F. Kemp.

New York, April 15, 1904.

ANOTHER ASPECT OF MINING FINANCE.

The Editor:

Sir.—Your interesting articles recently on 'Some Aspects of Mining Finance' seem to me to fail to illustrate the latest English development of the subject. Out of the chaos of mine promoters, finance and exploration companies, there has come to the front entirely another form of mining finance and management. There are certain firms, composed of partners—not companies—who, for reasons which will become apparent later, have steadily come forward in the past ten years, and are fast controlling the great bulk of mining enterprise. These firms have risen in various ways; some at first originally merchants, and some mining engineers. They are composed of various partners; financial men, mining engineers, mine managers; in any event, all are experienced mining men, devoting their entire time to the work. The business is generally organized on managerial lines. A central exploration company is usually created among their friends, when any particular field is to be covered, a portion of whose capital they may or may not own. The "firm" manages this company, in return for a portion of the profits. This exploration company searches for mines under guidance of the firm, and finding them, proceeds to develop, equip, and create them into subsidiary companies, which are in turn managed or controlled by the firm; sometimes for a portion of their profits, sometimes for direct fees. Whatever the details of internal arrangement may be, from the standpoint of the investor and outside engineer, the result is the same, and there are three or four features of this development that are worthy of note.

1. The position of a board of directors sinks into the background, for the clients of the firm find the capital for its enterprises, and these clients look on the firm as responsible; *ergo* the firm usually fills the board with its own partners, or men of their "group," who will guard their responsibilities properly from a directorial standpoint. Scandals from mismanagement by directors have been of rarest occurrences in these groups, both because of the domination of the firm, and from the *personnel* forming the boards.

2. The administrations of the mines are of very superior order. These firms usually confine their operations to specific regions, and the administrations of several mines are usually grouped together under a staff of specialists, such as no single mine could afford to employ. Supplies are bought in very large bulk, direct from manufacturers, and London expenses, by combined offices, are kept at a very low figure. The quality of men employed as managers and engineers in these groups is usually of very superior order, because, with a great staff, invaluable opportunity for comparative results arises, and the best man is rapidly brought forward. Working costs well balanced by extraction and working results is the watchword of administration.

3. The position of engineers and managers in such groups is much better than that of those employed in single companies, which are usually dominated by boards of titled nonentities, or worse.

As the manager or engineer with these firms is not dependent upon the failure of any one mine for his future—for "good mines do not make good managers"—under this form of administration, the opportunities of promotion are much wider, and constant employment more certain, for the field is not limited, as said, to one mine. Other larger mines, staff positions, and ultimately partnership, are steps directly open to a capable man.

4. Firms of this character have a name to maintain, for on their good name does their

ability depend to secure the vast sums of money which they employ, and they are never guilty of undertaking "wrong" ventures. At times even, when the failure of mines in depth precipitates a loss, they have supplied a new mine at their own cost—not for charity, but to keep alive the necessary confidence in their ability and integrity.

The irresponsible promoter who puts up a dummy board of pompous dignitaries until his shares are disposed of, is having great difficulty to get the public ear, and must disappear. These same pompous dignitaries are a sore trial to the honest manager, who slaves at the mine over working costs, and periodically answers their enquiries why he does not increase profits by raising the amount of gold per ton, instead of trying to reduce costs.

A feature of this form of organization which is making itself felt, is the continuity of the firm. Its senior partners retire and younger men are brought from administrative positions in the field, and the firm goes on. Transitory transactions for immediate profits, at the risk of good name, are not indulged in, for the name must be sustained. The investing public is fast recognizing this, and the universal preliminary among investors is a statement regarding a mine, that is, that it is a K. G. & B. mine, and not that Admiral Sir Dumfunny is chairman.

There is a marked tendency among these firms to territorialize, that is, to confine themselves to specific regions. In many instances they are interested in concerns which they do not control. There are in London seven or eight of such firms of prominence, South Africa furnishing the field for most. The leading firms in the four principal mining regions, in which Englishmen are mostly concerned, are mentioned below, with an approximation of the nominal capital and market value of the enterprises they control or manage. The members of these firms are often, as said, interested in other concerns; only those identified with the firms are included:

	Region of principal activities.	Nominal Capital.	Market Value.
Wernher, Beit & Co.	South Africa	$85,500,000	$342,000,000
Bewick, Moreing & Co.	Australia	42,100,000	70,550,000
John Taylor & Sons	India, etc.	30,500,000	65,500,000
Tarbutt, Son & Jansen	West Africa & Rhodesia	55,500,000	25,100,000

The market price for these enterprises, as compared to their nominal capital, gives food for thought.

There are in London, as set out in your articles, several exploration and finance companies, which are not controlled by such firms. At one time they predominated in the mining finance of London. Some have been managed with consideration for the public, and many not so. In all cases, practically, they are flotation companies pure and simple. When a mine is floated, so long as they maintain in it a considerable interest, they continue to look after the mine and guide its management, but so soon as the mine is in the hands of the public, they promptly forget it for other matters, and the administration goes to the dogs. Hence the investor has begun to consider somewhat, not only the character of investments offered him, but also whether he will need to "carry the baby" all alone or not.

In general, in the finance company arrangement set out so much in detail in your columns, the ultimate tendency is even worse than the individual promoter, for the latter has at least some moral responsibility, and a corporation has none. The general result is that the "firm" is rapidly becoming the main source of mine finance—and so much the better for the industry. There is no finance company in London, the ventures of which in the aggregate stand on the market at an amount equal to their nominal capital—itself a useful indication of previous career.

Observer.

London, April 13, 1904.

THE SIROCCO FAN.

The Editor:

Sir.—It is unfortunate that the power and the water-gauge were not given in the table of tests of the Sirocco fan in your issue of April 14, as without the latter the equivalent orifice of the mine cannot be obtained, and this would be interesting with a view to determining whether or not the two Guibal fans were suited to the work. The experiments of the committee of the North of England Institute of Mining Engineers, in 1900, showed that a 36-ft. Guibal did not reach its maximum efficiency with a mine under about 42 sq. ft. equivalent orifice when, at 6,000 ft. periphery speed, fans of this size gave from 180,000 to 200,000 cu. ft. of air per minute, from which it seems probable that the Guibal fans tested in comparison with the Sirocco were too large for their work, and therefore working at very low efficiency. The so-called paradox of the air escaping from the fan at a higher speed than that of the tips of the blades is not uncommon with Guibal fans,[1] where a 16-ft. fan, 4 ft. 6 in. wide, is said to have given 360,000 cu. ft. of air at 130 revolutions, and a similar fan with larger intake circle 500,000 cu. ft. both, however, with low water-gauge and low efficiency, the equivalent orifice in the latter case being about 200 sq. ft.

R. V. Norris.

Wilkes-Barre, Pa., April 23, 1904.

THE EQUIPMENT OF MINING LABORATORIES.

The Editor:

Sir.—May I contribute my views and opinions to the discussion on the technical education of mining men and metallurgists which is now appearing in the Journal? As an old student, on the engineering side, at Owens College, Manchester, I can speak with some experience of college education, and my present position, as your representative here, which I have occupied for some twelve years, has afforded me many opportunities for becoming acquainted with the needs and requirements of the profession.

In the first place, I consider that the labors of the Institution of Mining and Metallurgy in the cause of technical education, should be concentrated on the reform of the Royal School of Mines, and that the new school should be entirely independent of other existing or contemplated schools and colleges. The evolution of such a school of mines, worthy of the mining and metallurgical professions, and dealing with the subjects of chief interest to the Institution, is a sufficiently large matter in itself. I have always felt that a Bessemer Memorial was out of the scope of the Institution's program. For one thing, the metallurgy of steel is not of special interest to the members, and for another, the public services rendered by Bessemer, are, to say the least, open to doubt. The Institution is also joining in the, so-called, Rosebery scheme for the establishment of general technical colleges in London. Under such a scheme, the School of Mines would be a subsidiary component, and its control would not be in the hands of the people intimately interested in its success.

My own view is that a School of Mines should be established in the London district entirely free from the Royal College of Science, or the "Rosebery" technical colleges, and that special attention should be paid to the mining and metallurgy of gold, silver, lead, copper, zinc, etc., leaving iron and steel to be specialized at Birmingham and Sheffield, and coal mining at these two centers and at Newcastle-on-Tyne. The advantages and disadvantages of a school of mines situated in London I will discuss later on.

I hold that the object of a school of mines is to turn out young men, of bodily stamina and moral force, trained in the principles of mining and metallurgy. The practical applications of science can be far more efficiently studied in the mines and works, where commercial considerations have a foremost part, than in the best possibly equipped laboratory. The chief engineer of a mine, or the manager of a smelter, prefers a youth who is grounded in the principles and has an intelligent mind, and is content to teach him the practical and economical applications of his knowledge himself. The equipment of a college laboratory with modern and expensive smelting plant is an unnecessary expense. The facts which the student learns from them are specific, and vary from day to day, and in different districts of the world, and he will probably have to unlearn the facts so acquired when he gets his first appointment at a smelting works.

Research work should be a secondary consideration at a technical college; that is, research on subjects at present obscure. Facilities for such research are of use only to the professor, and the work, if done by students, can only be carried on by his direction and for his benefit, for the student is too young to evolve such lines of research out of his own head. If by research work is meant the setting of problems for the student to solve—problems, the answers to which are matters of common knowledge—then I agree that such work should form part of every curriculum.

In sketching out a course of study, we are too apt to assume that the student has as great a knowledge of the world as ourselves at forty, and also that the receptivity of the student is perfect, and we accordingly map out a course which we should ourselves appreciate if we could go back to eighteen years of age, retaining the knowledge of the world which we possess now. We ought to remember that the student is young, with little or no knowledge of the world, and is unable to grasp the value or the application of the learning that is put before him. A too elaborate and advanced course with illustrative operations, all on actual commercial scale, is lost on the average student. For this reason, it is advisable that his training in the ways of the world should begin as early as possible, and that his college course should not be too long or too elaborate.

One of the advantages of having a school of mines entirely independent of other institutions, is that the course of study in collateral subjects, such as geology, mathematics, physics, chemistry, languages, etc., can be adapted to the requirements of the student. In mathematics, the school of mines man should not be

[1] See *Transactions* American Institute of Mining Engineers, Vol. XX., p. 671.

burdened with the calculation of the orbits of the planets, nor the undulatory theory of light, nor with asymptotes, catenaries and paraboloids. The chemical course need not include organic chemistry, and the language classes should make a specialty of French, German and Spanish, and the authors studied need not be poets. In geology, I should place paleontology in the background, and bring forward ore-deposits and water-supply.

In most college courses there are too many holidays. In fact, the classes sit for little more than half the year. Judging by my own experience, there was no reason for a three months' long vacation. I should like to see the year filled up from October to May at college, and three months in the summer devoted to field work. The study of metallurgical practice, as I have already indicated, would not occupy much of the summer, but a great deal could be done in teaching surveying, timbering, stoping, pumping, dressing and concentrating, at some of the metalliferous mines in Cornwall and elsewhere. The above remarks will show that I am of opinion that London is perfectly suitable as the headquarters of the School of Mines.

The course of study which I should like to see inaugurated would occupy three years, and would be suitable for a youth to commence when seventeen years old, and having a general education enabling him to pass the London University matriculation examination. In the three years, his studies, besides mining and metallurgy, would include geology, petrography, mineralogy, inorganic chemistry, chemical analysis and assaying, physics (elementary heat and electricity) applied mechanics, surveying, mechanical drawing and mathematics, including plane trigonometry, and the application of the first integration to engineering formulas.

If any particular names are to be associated with the new school, I suggest that the chairs of geology, metallurgy, mining, etc., should be named after Murchison, De la Beche, Percy, or Warington Smyth, who all did far more for the profession than Bessemer.

In conclusion, I should like to add that manly sports of all kinds should be encouraged. Youths are, of course, apt to think more of them than of their studies, but that is no reason why we seniors should look askance at them. Bodily vigor and self-reliance are acquired by the footballer and cricketer. It is not a scientific man who is required to manage a mine or plant. More than knowledge is wanted. To be able to command men and win the confidence and personal esteem of those with whom he comes in contact is equally necessary.

Edward Walker.

London, April 14, 1904.

Nearly one-third of the world's output of quicksilver is credited to the United States. In 1873 three countries reported 1,920 metric tons. Thirty years later, in 1903, five countries mined 3,092 tons, of which America contributed 1,010 tons.

An immense amygdaloidal cavity lined with amethyst, measuring 33 ft. in length, 16.5 ft. in width, and 10 ft. in height, and holding about 35 tons, was lately found in Brazil. It was one of the attractions of the Düsseldorf Exhibition, in 1902, being put together to form the amethyst grotto.

THE COPPER DEPOSITS OF ORANGE COUNTY, VERMONT.

By Henry Lloyd Smyth and Philip S. Smith.

The copper deposits of Orange county, Vermont, have been described by Wendt,[1] Peters[2] and Howe[3] in this Journal, and by Wheeler[4] in the Columbia School of Mines Quarterly.

The present communication is intended to give a summary of the results of geological studies carried on during the last 10 years in this region by different students of Harvard University. The junior author has taken by far the largest share in this work. A more complete account of these studies will be published later.

In Orange county, Vermont, there are three deposits of pyrrhotite with chalcopyrite, occurring along the same general northeast-southwest line, within a distance of 15 miles. The northernmost of these is at the old Union mine, in the town of Corinth; the most southern is at the Elizabeth mine, in the town of Strafford; while nearly midway between is the Ely mine, at Copperfield. We have been unable to gather any new facts regarding the Corinth deposit, as the mine is filled with water, and therefore no further reference to it will be made here.

These deposits, while they have contributed but little copper to the world's supply, belong to an interesting and widely distributed type, namely, deposits of pyrite, or pyrrhotite, often of great size and usually with but little gangue material, carrying, below the level of enrichment, a small amount of copper in the form of chalcopyrite. The ore-bodies occur on the eastern flank of a broad anticlinal fold, pitching north, in which the rocks, for the most part, are metamorphic sediments of undetermined age. The oldest rocks exposed in the southern axial portion of this anticlinal are mica schists, containing calcite, to which the geologists of the Vermont and New Hampshire Surveys have given the name calciferous mica schist. This formation passed upward into rocks containing much more calcite, so that finally, on the northern and western sides of the fold, the lower rocks are partially surrounded by an incomplete ring of impure, semi-crystalline limestones, interstratified with bands of calcareous mica schist. On the eastern side of the arch, the more calcareous rocks appear to be lacking.

Overlying the calcareous member, on the western side, and occurring also on the eastern side of this fold, are formations of slate, including some areas of roofing slate. The stratigraphical succession across this anticlinal is therefore as follows: The lowest member consists mainly of mica schists, containing some calcite; these are overlain by impure limestones, interstratified with mica schists; while these, in turn, are succeeded by mica slates or phyllites. The equivalence of the two slate formations, on the opposite sides of the arch, has not been proved.

Besides these metamorphic sediments, igneous rocks, both acid and basic, occur in the district. The acid rocks consist of numerous dikes of fine to medium-grained biotite granite, which is lithologically identical with the well-known Barre granite, a portion of which, indeed, extends into the north-central part of Orange county. Besides these dikes of fine-grained granite, a few dikes of coarser acid pegmatite are found, which, in some localities, cut the granite. From their relations and lithological character, the pegmatite dikes seem to have proceeded from the same magma as the granite. They frequently contain a little pyrrhotite, chalcopyrite and black tourmaline. It is believed that the intrusion of the granite has played an important part in the genesis of the ore deposits.

In the northern part of Orange county, a number of camptonite dikes occur, none of which, however, was found in contact with the ore-bodies. These dikes are essentially similar to those described by Kemp and others[5] as occurring in various localities in northern Vermont, and in the Champlain district of New York.

It is an interesting fact that camptonite dikes, presumably belonging to the same period of intrusion, cut the sulphide deposits of the Eustis mine, at Capelton, P. Q., not far from the Vermont line, and are later than the formation of the ore.

The Orange county ore-bodies occur in the lower formation of mica schists, and therefore these rocks are of primary geological interest. At Copperfield, where outcrops are numerous and have been most closely studied, three varieties of schist have been noted. The first, which, on the exposed surface, weathers to a light gray color, appears in the outcrop relatively massive and is found in beds up to 50 ft. thick. This rock is a medium-grained, crystalline aggregate of quartz and biotite, with subordinate muscovite and calcite. All of these minerals, except a little primary quartz and biotite, have crystallized in place essentially at the same time.

The second variety consists of very thinly laminated, generally contorted, dark colored, fissile schists, made up principally of quartz, biotite and chlorite. Numerous accessory minerals also occur in it, the most abundant of which is sillimanite. Oftentimes, the dark coloring matter appears to be in part finely disseminated, dust-like carbon, which was probably original. These rocks generally occur in narrower bands than the first variety.

The third kind of schists consists of certain rather thin bands of dark-colored amphibolite, which are generally interbedded with the other schists, but occasionally split into dike-like branches across them. The amphibolites, which are well foliated and made up of coarse green hornblende, quartz and fragments of plagioclase feldspar, mainly labradorite, are believed to be ancient igneous intrusives of basic character, now, however, almost completely recrystallized. The feldspar is practically the only original mineral present.

In some bands, in both the massive and fissile mica schists, as well as in the amphibolites, there are numerous lenses and narrow veins of quartz thoroughly granulated or sheared. The quartz lenses are particularly abundant at the turns of the minor folds.

The following minerals, besides those mentioned above, occur in the schists at Copperfield: Garnet, actinolite, tremolite, andalusite, staurolite, apatite, rutile, muscovite, tourma-

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[1]Wendt, A. F. 'The Pyrite Deposits of the Alleghanies (Vermont Deposits).' Engineering and Minign Journal, Vol. 42, page 4.

[2]Peters, E. D., Jr. 'The Ely Mine of Vermont.' Engineering and Mining Journal, Vol. 52, pages 6-7.

[3]Howe, H. M. 'The Elizabeth Copper Mine.' Engineering and Mining Journal, Vol. 42, page 327.

[4]Wheeler, H. S. 'Copper Deposits of Vermont.' *Columbia School of Mines Quarterly*, Vol. 4, pages 219-224.

[5]Kemp, J. F., and Marsters, V. F. 'The Trap Dikes of the Lake Champlain Region.' *Bulletin* No. 107, United States Geological Survey. 62 pp.

line and graphite. Red garnets are generally present both in the massive and fissile schists as well as in the amphibolites. They are perhaps particularly abundant in large individuals near the contacts of the amphibolites with the mica schists. They appear to be the last minerals formed in the schists, since they enclose the others. It is interesting to note, also, that garnet sometimes occurs in the schist in narrow bands, composed of minute anhedral particles practically unmixed with other minerals.

In many of the quartz lenses near the Ely mine, handsome crystals of cyanite are found, which, in places, enclose corundum. The cyanite was formed after the fracturing of the quartz lenses, as is shown by its relation to the surfaces of breaking, as well as by the unbent character of the blades.

In the outcrops of schist, two structures are often observable. One of these, corresponding to the contacts between the more massive and more fissile layers, is greatly contorted, while the other, which is frequently the more obvious structure, is far more regular, though still wavy and variable in both dip and strike. The latter structure is the one parallel to which most of the present minerals of the schists have crystallized, and along which the firmer rocks cleave, while the more contorted structure probably represents the original bedding.

At Copperfield, in the vicinity of the ore-body, the following structural features have been observed. The strike of the original bedding is northwest and its dip northeast, at angles, the general average of which is undeterminable, but probably high. The secondary structure, along which most of the present rock constituents are aligned, also strikes west of north, but is markedly oblique to the bedding. It also dips northeast, but at low angles, ranging from 15° to 35°. Therefore, the dip of the secondary structure is much lower than that of the original structure.

This unusual relation between bedding and a secondary foliation is further complicated by an interesting series of cross folds or monoclinal buckles. The axes of these folds, of which a large number have been traced, are essentially parallel with one another and run about N. 40° E. The drop or step-down, in most cases, is on the southeastern side. These cross-buckles are later than the main period of folding.

Our studies have shown that the Ely ore-body, which consists of a chimney of short length along the strike and a rather small horizontal section, but very persistent in depth, is parallel to this series of cross-buckles, and, indeed, occurs along the line of one of them. Along this buckle, the beds appear to have parted and separated, leaving a series of connected open spaces, somewhat like the saddles along certain anticlinal folds. These spaces were found and followed by the mineralising agents. Part of the ore, therefore, is probably an open space-filling, but the greater part has undoubtedly resulted from replacement.

The ore consists mainly of pyrrhotite and subordinate chalcopyrite intermingled, together with unreplaced minerals from the schists, principally quartz and biotite. It is interesting to note, also, that in several places in the ore-body black tourmaline, in small crystals, is found penetrating and enclosing pyrrhotite and chalcopyrite, evidently having crystallized contemporaneously with them. The relative age of the ore is shown by the fact that it includes and cuts some of the quartz lenses above referred to, and also includes secondary biotite and quartz from the schists. In places, the ore also cuts the secondary structure of both the mica schists and amphibolites. It is subsequent, therefore, to the general metamorphism of the series and to the development of the secondary structure.

A few hundred feet southeast of the Ely ore-body and having a strike parallel with it, presumably occurring along the line of a cross fold or buckle, is a quartz vein, containing large crystals of schorl, or black tourmaline, intergrown with pyrrhotite and chalcopyrite. Frequently these crystals are fractured parallel to the base, and filaments of quartz have formed between the slightly dislocated fragments. Nearest the walls of this vein, there are bands of siderite and calcite, with small crystals of tourmaline. These are succeeded in the interior by quartz, with large tourmaline crystals.

In the vicinity of the Elizabeth mine, the schists, although otherwise similar to those at Copperfield, are less coarsely crystalline, and contain fewer minerals of contact aspect. The ore-body is a vein-like mass of pyrrhotite with chalcopyrite and subordinate amounts of quartz and biotite, and now and then tourmaline, striking nearly north and south and dipping east, at a high angle. The chief point of interest, at the Elizabeth, is the clear evidence it furnishes as to the origin of the ore by replacement. The deposit lies along the course of a narrow dike of medium-grained biotite granite. In places, this granite is completely changed to ore; in other places, less completely; while in a few spots, it has almost entirely escaped replacement. In different parts of its course, the dike lies on one or the other of the walls of the ore-body, or else wholly within it, the replacement having affected the adjoining schists, as well. The replacement is further shown by the fact that frequently cores of schist, incompletely replaced, all standing with their cleavage parallel to that of the wall rocks, are found in the ore-body. For the most part, the feldspars of the granite seem to have resisted replacement more effectively than the quartz and biotite. In certain cases, feldspar only is found in a matrix of sulphides, the associated quartz and other original minerals of the granite having entirely disappeared.

The replacement of this dike fixes the age of the Elizabeth ore-body as subsequent to the intrusion of the biotite granite of this portion of Vermont. There has evidently been some movement along this dike, as is shown by slickensiding and by the divergence in dip in many places of the hanging and foot-wall schists.

The general facts broadly sketched above, which will be stated more fully in a forthcoming paper, have led us to the following conclusions:

1. The two ore-bodies in question have been formed mainly by replacement, at the Elizabeth, along a fault-fracture, and, at the Ely, along openings formed by folding.

2. The formation of these ore-bodies was not connected with the principal folding and general metamorphism of the region, but was subsequent to it.

3. The regional metamorphism, to which period we refer the formation of the fractured quartz-lenses and veins, does not seem to have been attended in this district with the formation of metallic sulphides in the open spaces along with this quartz.

4. The formation of the sulphide deposits in question probably followed closely on the intrusion and consolidation, at the levels now visible, of the biotite granite. There is reason to believe that the broad arch, on the eastern flank of which these sulphide deposits occur, is underlaid by a great bathylith of biotite granite. The local buckling, at Copperfield, and the faulting movement, at Elizabeth, may be explained by the shrinking and settling of such a bathylith in cooling, which would necessarily bring down the overlying rocks unequally.

5. On account of the association, in both localities, of the ore with tourmaline, and on account of the vigor with which the country rock has been attacked and the completeness with which it has been replaced, we think it probable that the mineralizing agents with the ores were derived from the deeper and unconsolidated portions of the granite magma referred to, and that the mineralising action was largely pneumatolitic in character.

6. If the pyrite-chalcopyrite ore-bodies, at Capelton, P. Q., are, as seems not unlikely, of the same general age, it follows that here, also, the work of ore making was finished before the time of the intrusion of the camptonite dikes.

AERIAL TRAMWAY IN SPAIN.—A recent report from United States Consular Agent A. E. Carleton says that the longest aerial cable for the transportation of iron ore in Spain is now approaching completion. The cable, which is 12 miles long, starts from Culativi, a point in the Sierra Alhamilla, 4,400 ft. above sea level, and will terminate at Casa Fuerte, on the coast, half-way between the port of Almeria and Cabo de Gato. At Casa Fuerte a pier will be constructed for the loading of steamers. It is claimed that the mines which are to feed this cable have been proved for over 1,000,000 tons of red hematite of approximately 52 per cent iron and 4 per cent of manganese. The property is owned by the Sociedad Minera Cordobesa de Sierra Alhamilla. The cost of the cable and the right of way will be about $155,000.

CALIFORNIA PETROLEUM AS FUEL FOR STEAMERS.—There are now 137 steamers, large and small, aggregating upward of 106,000 gross tons plying in and out of the port of San Francisco, which are using California oil as fuel. At the principal Pacific coast ports supplies of oil may be obtained, as well as at the Hawaiian Islands, Alaska and some Asiatic ports; but to most places the steamers have to take a supply for both the outward and return trip. It is generally figured that 4 bbl. of oil equal in fuel value one ton of the ordinary steam coal used on the Pacific coast. The steamers are usually supplied with tankage capacity to carry a load of oil for the outward and inward trip. If they can get return fuel oil the weight of oil necessary for a voyage is only about 60 per cent of the load which would be required if coal were used. But if they have to carry oil for the round trip, the weight of oil is considered about 20 per cent in excess of what would be needed if coal were used, and were obtainable at each end of the route. As to bulk, the conditions differ, weight only being considered in the above statement.

THE CLIFTON DISTRICT, ARIZONA.

Editorial Correspondence.

The Clifton district is turning out about 60,000,000 lb. of copper a year. This is more than one-third of the annual production of Arizona, and places the district in the first rank among the copper camps of the Southwest. Taking into consideration the substantial and conservative basis upon which the industry has been established, as well as the present known resources of the district, it is safe to say that operations can be continued on the same extensive scale for many years to come.

The Clifton ore, relatively speaking, is low-grade. The rich bodies of carbonates and oxides that gave the first impetus to mining, when the product had to be transported 700 miles by wagon to reach the nearest railroad point, have long since been exhausted, and in their place the poorer sulphides, found in large bodies below the oxidized zone, are now chiefly exploited. Much of the ore carries less than 5 per cent copper, and, while a small proportion runs considerably higher, the average for the district is below rather than above that figure. The gold and silver values are so small as to scarcely repay separation.

That the district has attained its present development and prosperity under the conditions speaks well for the management of the companies, which has shown progressiveness and ability to deal with the various problems that have been presented. Up to about 1896, the output of copper was in the form of bars made by a single fusion; operations were conducted on a small scale, though, owing to the richness of the ores, there was a liberal margin for profits; and a minimum outlay was represented in the smelting plants. The change to matte smelting and converting, consequent upon the variation in the character of the ore, necessitated new and expensive plants, and a vigorous expansion of operations all along the line.

The mines are situated within a quadrangular area, about nine miles long by four miles wide, extending from the San Francisco river on the northeast to Eagle river on the southwest. It is a region of rugged high mountains and deep cañons.[1]

Owing to the rough nature of the country, it has been no easy matter to find suitable sites for the smelting and concentrating plants.

ARIZONA COPPER COMPANY'S SMELTER AT CLIFTON.

The works of the Arizona Copper Company are situated at Clifton, near the junction of Chase creek and San Francisco river. Ore is brought down from the mines around Metcalf and Morenci, six miles distant, by a narrow-gauge railroad that follows the dark winding cañon of Chase creek. This road also connects the mines of the Shannon Copper Company, on Shannon Hill, above Metcalf, with the smelter, which is about a mile below Clifton. Both the Arizona and the Shannon smelters enjoy the advantage, almost unique for Arizona, of a plentiful supply of water, taken from the San Francisco river. The Detroit Company has erected its smelting plant around the mines of Morenci, and has to pump water a distance of six miles, with a vertical lift of 1,500 feet.

The mining operations of the Arizona Copper Company are on a very extensive scale, about 500,000 tons of ore being produced annually. Its properties include the famous Longfellow group, which has yielded large quantities of rich carbonates and oxides. Later developments have shown a continuance of the lodes in the depth, although the ores are leaner, and of sulphide character.

At the Coronado mine, owned by the same company, recent exploration has also been of the most encouraging character. This mine is situated high up on the slopes of Coronado mountain, a flat-topped mass of granite rising to an altitude of 7,400 ft. The ore-body is noteworthy from the fact that it has been formed along a fault-fissure between granite and quartzite, while most of the deposits in the district occur near intrusive contacts, either in limestone or the intersecting porphyry dikes. The present workings are in new ground, below the oxidized zone. There are two shafts on the principal vein, 1,600 ft. apart, and connected on the 300-ft. level by a drift that runs most of the way through ore. It is estimated that there are fully 500,000 tons of ore already in reserve, above the 500-ft. level.

DETROIT COPPER COMPANY'S PLANT AT MORENCI, ARIZONA.

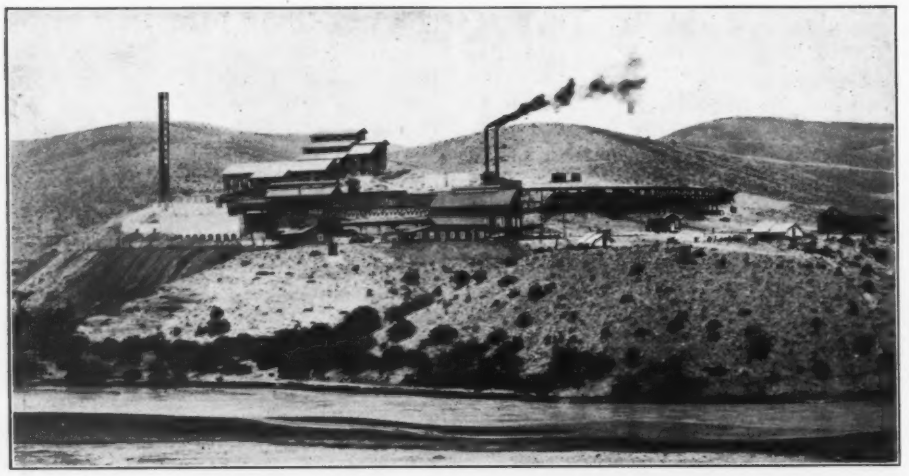
The Coronado mine is reached from Metcalf by a gravity incline, one of the largest in existence. It is a single track and makes a rise of 1,200 ft. in a length of 3,300 ft. The grade varies from 15° at the bottom to a maximum of 35° at the upper end. Two steel cars holding about 2.5 tons each are run in balance, the trip taking about three minutes.

The gravity inclines are a striking feature of the mines about Metcalf. There are no less than six in operation by the Shannon and Arizona companies. They are expensive to

[1]The geological features of the Clifton district have already been described in this Journal, May 9, 1903.

install, and there seems to be no good reason why they should be preferred to the aerial tramway; as a rule from five to seven men are required to handle the cars at both ends, in addition to the tramming that is done from the mine to the incline, so that, as regards operation, they have certainly no advantage over the latter.

At the Metcalf group of mines the ore is largely exploited by open-cuts, some of which have reached notable dimensions. The ore is mostly malachite and azurite, but changes below to chalcocite. As the gangue is porphyry, the low-grade oxidized material can be treated economically by leaching, a process that has been carried on for some time at the Arizona Company's plant. On the same ridge as the Metcalf, but on a higher spur, are the Shannon mines. The ore-bodies outcrop at the surface as a series of prominent ledges, originally limestones, but now showing little else than iron oxides and quartz. Some rich carbonates are being mined within a few feet of the outcroppings, while the continuations of the ore-bodies, which pass at shallow depths into sulphides, are opened at successive levels by adits and drifts driven into the side of the mountain.



SHANNON SMELTER, CLIFTON, ARIZONA.

The mines operated by the Detroit Copper Company are grouped around the town of Morenci, a few miles west of Metcalf. One of the larger producers here is the Copper Mountain, which takes its name from a ridge that rises just north of the town. The principal ore-body is a porphyry dike 300 ft. thick, included between limestones and shales and running into the mountain; it has a dip of 75° S.E. The whole dike has been mineralized by secondary concentration, the ore (chalcocite) occurring in veinlets and impregnations of finely divided particles. In general the ore grows progressively richer toward the middle of the dike, where the ore-bearing solutions found easy passage through the fissured and shattered rock, leaving a vein from 3 to 10 ft. wide, of very rich ore. The average width of the workings is about 200 feet.

Adjacent to the Copper Mountain mine is the Arizona Central, opened on two large faulted fissures known as the Copper Mountain and Williams veins. The Williams vein cuts through shales and limestones, and averages 150 ft. wide. Considerable native copper has been mined from this vein, the usual ore, except near the surface, being chalcocite.

Altogether the Detroit Company is producing from 700 to 800 tons of ore a day, of which a large part is sulphides. A complete system of surface railroads connects the various mines with the smelting works, as well as with the main line running to Morenci, so that the ores and supplies are handled with the greatest economy.

Very little in the way of deep development has been done in the mines of the district. As a rule, the lower limit of the zone of chalcocite enrichment marks the extreme depth attained by the underground workings. The thickness of this zone varies considerably in the different mines, but is seldom more than 300 ft., making, with the oxidized ground above, an aggregate width that ranges up to 500 or 600 ft. Recently, however, plans have been formulated for carrying on exploration by means of adits, driven from much lower levels than any now in the district. Work has already been started on one undertaking of this kind, known as the Chase creek tunnel, while surveys have been made for an adit that is to have a total length of 3.5 miles, and will start from the San Francisco river above Clifton, cutting across the mineral belt in a northwesterly direction, at a depth of from 300 to 1,500 feet.

METCALF AND SHANNON HILLS, METCALF, ARIZONA.

Clifton is the only large copper district in Arizona, where milling is an essential feature of the metallurgical treatment. This practice was first introduced by the Arizona Company for handling the lean oxidized ores, too siliceous for direct smelting, and has since been adopted by all the companies for treating the low-grade sulphides. The small proportion of ore that is smelted without concentration, largely consists of rich oxides and basic material that can be used advantageously as a flux. By maintaining a proper balance between the relative proportions of these ores and concentrates, a matte of bessemerizing grade is obtained in one fusion.

There is no marked difference in the general plan of concentration at the different mills. The mill of the Detroit Company, however, is noteworthy from the extended use that is made of gas engines and electric motors for power purposes. New Mexico anthracite is used in the gas generators, and the efficiency obtained is very high, averaging about 1.3 lb. of coal per h. p. hour. The main power supply is furnished by two 160-h. p. Crossley engines. The mill is in two sections, each having a daily capacity of 325 tons, but it is to be enlarged to treat 1,000 tons. Rolls and Bryan mills are used for crushing, while the principal concentration is done on Frue vanners. The vanner has been generally adopted in the other mills of the district, on account of the close concentration required to save the values, which are distributed in minute particles throughout the gangue.

At the works of the Arizona Copper Company the unique plan of concentrating carbonate ores has been carried on continuously, since the first installation of the mill. The ore thus treated consists of malachite and azurite in a quartzose gangue. It is crushed to coarse size and passed through jigs, the concentrates of which go to the smelter, while the tailings are reserved for treatment by lixiviation with sulphuric acid. The acid is made by roasting pyrite and copper concentrates; about 14 tons are consumed daily. A part of the copper thus recovered is marketed in the form of bluestone.

The smelting plants in the district have modern equipment, and have been designed with a reserve capacity sufficient to give a much larger output than that made under nor-

mal conditions. The Detroit and Shannon smelters were built recently. The former company has only one furnace in operation, but it is of record size, measuring 264 by 42 in. at the tuyeres and 13 ft. in depth. It is supported directly on a cement foundation, which gives it a very neat and substantial appearance. There are 20 tuyeres of 4.5 in. diameter on a side. Air is supplied by a Connersville blower, which has a capacity of 20,000 cu. ft. per minute. From the forehearth the matte is tapped directly into the converters, which are of the barrel type, 5 ft. 6 in. in diameter, and 8 ft. long. Of the ore charged into the furnace, about 45 per cent consists of concentrates and flue-dust; the average tenor of the ore is 11 per cent copper. The matte is blown into high-grade blister copper. A second furnace, 44 by 144 in., is held in reserve, and an additional furnace of large size will shortly be erected. The company is planning other betterments, that will facilitate the handling of ore and fuel, and increase the general efficiency of the plant.

The works of the Arizona Copper Company are perhaps the most completely equipped of any in the Southwest. They comprise machine, molding and repair shops, which are able to turn out nearly everything needed in the way of supplies and repairs for the mines, smelter and railroad. The power installations altogether have a capacity of 4,100 h. p., comprising 1,400 h. p. in gas engines, 1,100 h. p. in distillate and 1,600 h. p. in steam engines. The smelting plant consists of five furnaces, 240 by 39 in. at tuyeres, each of about 300 tons daily capacity. As a rule only two furnaces are worked at a time. In the converting building there are three stands and nine 7.5-ton converters, the latter being handled by an electric traveling crane. From the furnaces, the matte is tapped into a reverberatory, which serves to keep it at an even temperature for the converters. The works are lighted by electricity throughout.

The smelter of the Shannon Copper Company was erected in 1902, but it has only been in continuous operation for about a year. It is conveniently situated as regards water supply, being within a short distance of the San Francisco river, though sufficiently removed to give room for disposal of slag for a long time to come. The mill has been placed higher up on the hillside, and adjacent to the smelter; the ore is hoisted from the cars to the crushers, and passes by gravity through the various steps of concentration onto the charging floor of the furnace. There are two furnaces, 171 by 44 in. at tuyeres, one of which is held in reserve. At present the matte is converted into blister copper at the Arizona Company's works, but a converting plant will in time be added to the smelter.

COAL IN INDO-CHINA.—A recent official report says that coal mining in French Indo-China is developing in an encouraging way. The most important mines are at Hongay, where 2,500 men are employed. The coal seam worked is nearly flat, and is only 25 meters below the surface; most of the mining is by open cut. A railroad 11 km. long extends from the mines to the shipping port. At Nongsen there is a mine, producing about 100 tons of coal a day. The colliery at Dongbrieu is now shipping 25,000 tons a year. A new mine is being opened at Vinh-Phuoc, and promises well.

MECHANICAL CONVEYORS.

By Walter Renton Ingalls.

(*Continued from page* 641.)

CARRYING CONVEYORS.

The conveyors of this type consist substantially of an endless belt, or a continuous chain of pans or buckets. There are numerous modifications of both forms.

Belt Conveyor.—The belt conveyor is essentially a band supported on idlers and running over pulleys at either end, by one of which it is driven. A suitable arrangement at the other end serves to take up slack and keep the belt tight. The simplest conveyor of this type has a flat belt, which has to be quite wide in order to prevent material from spilling off. To obviate this, the belt is concaved, and to reduce the wear of the belt by being thus flexed it is manufactured in various ways. There is also a great variety in the composition of rubber employed and in the design of the supporting rollers. Rarely, a flat belt with side rims is run over plain rollers.

Irrespective of these modifications in design and construction, the belt conveyor is for many purposes the most efficient of all conveyors. It requires the least power to drive, save for the highly developed forms of continuous bucket conveyors; its first cost is moderate, and the expense for repairs and renewals is less than for any other form of approximately equal first cost. It is adapted to a great variety of uses, carrying ore up considerable inclines and at changes of angle, and has great capacity, but it has the drawback of inability to discharge at intervals, save by the use of a rather awkward and expensive tripper. It is possible, however, where electric power is available, to install a movable conveyor, run by a self-contained motor, and to cause the belt to discharge over the end into any one of a series of bins, by moving it forward or back; and the direction of the belt travel can be reversed. Thus, a line of bins 200 ft. long can be filled by a conveyor of a little more than half that length, the feed being received midway in the line of the bins. Similarly such self-contained conveyors can be constructed in portable form and used for work about the yard, such as the loading of railway cars. These are things which can not be done so conveniently with any other type of conveyor. Moreover, this can be used as a sorting belt at the same time as a carrying belt, and in taking ore to breakers and rolls a magnet can be set over the belt to pick out drill points and other undesirable pieces of steel and iron.

The rubber belt is quite durable and it may be re-enforced on the wearing side by an extra layer of rubber, like elevator belts. It is, however, unsuitable for carrying ore from dryers, etc., which is of such temperature as to affect the rubber. The limit of rubber belting in this respect is soon reached (it would be unsafe to attempt to carry ore so hot as 150° C.) but in such cases the Leviathan or Gandy belts may be substituted. Such cotton-duck belts are, however, less durable against abrasion than the rubber.

The capacity of a belt conveyor depends upon the width and speed of the belt and the weight of the material to be carried. If the belt is troughed it is safe to estimate that the load will cover one half of the total width of the belt and that the depth in the center will be one quarter of its own width. The cross-sectional area of the load (which may be considered as an inverted triangle) multiplied by 12 will give the number of cubic inches of material per running foot of length, and from the weight of the material and speed of the belt the capacity may easily be calculated, but an allowance must be made for irregularity in feeding. A flat belt will carry only about one-third as much as a troughed one.

A belt speed of about 300 ft. per min. is commonly used, but 450 ft. per min. is not excessive; belts have been observed to run smoothly at speed as high as 900 ft. per min., but the wear on both the belt and the idlers was then excessive.

A troughed 12-in. belt, run at 100 ft. per min., is able to carry 187.5 cu. ft. per hour, or 14 tons of ore weighing 150 lbs. per cu. ft., but to perform the duty that we have assumed for other conveyors in this article, viz., the transport of 10 tons per hour, we should install practically a 12-in. belt and run it at about 300 ft. per min. The cost of such a conveyor installed would be about $600 for a length of 100 ft. It would require about 3 to 3.5 h. p. to drive, assuming it to be properly installed. No general rule can be given for estimating the power required to drive a belt conveyor, which depends largely on the arrangement of the idlers. If they are too far apart the belt will sag down between them, increasing the load; if they are too near together the frictional resistance is increased. The greatest item of repairs in connection with a belt conveyor is the replacement of the belt, which is the most costly single piece of the apparatus. If the belt lasts five years the cost of repairs will come to about 12.5 per cent per annum; a belt life of only 2.5 years would mean a repair cost of about 20 per cent per annum. In a certain large works where a good many belt conveyors are employed the actual expense for repairs is not much more than 12.5 per cent per annum.

Continuous Bucket Conveyors.—The pan and bucket conveyors consist essentially of an endless chain of overlapping pans and buckets, which may be arranged in a great variety of ways. One of the simplest is the endless traveling trough conveyor (referred to also as the open trough conveyor and apron conveyor), consisting of a series of overlapping sections of light sheet steel trough, which are secured on the underside to a heavy link-belt chain (or to a pair of chains); the chain passes over a sprocket at each end of the conveyor and the pans are supported on rollers attached to the frame. These conveyors are considerably more expensive than the belt conveyors. The first cost of a 12-in. conveyor of this type, which would have capacity for 10 tons of ore per hour, would be in the neighborhood of $11@$12 per foot, installed. Ordinarily they have the disadvantage of being able to discharge only at the end, where the pans pass over the tail sprocket (although in the forms wherein the pans are carried between a pair of chains, they can be arranged to dump at intermediate points by having a dip in the rails) and in this respect are of more limited application than the belt conveyors, but on the other hand they are suitable for conveying hot material or substances that would injure a belt. Conveyors of this type, of heavy construction, are used at various places for the transportation of hot slag and when properly installed give good service. It is only a little step further to the casting and conveying machines for pig iron and other metals.

For the transportation of ore and coal and such substances the highest development in conveyors of this class is to be seen in the Hunt and the McCaslin and similar designs. These consist of a series of deep buckets, which overlap so as to prevent spilling of material between them while being fed, carried on wheels running on rails. The whole contrivance is virtually a chain, or endless train, of small cars. In the Hunt conveyor, the train is moved by an engine having an arrangement of gears and pawls so disposed as to engage the cross-rods or rivets connecting links in the chain to which the buckets are fixed. This gives a continuous pushing action and an even and practically noiseless motion of the conveyor. The buckets may be discharged at any desirable point by adjusting a simple lever which engages with each bucket and turns it completely over. The buckets may also be fed at any point; this is done usually by means of a mechanical device which insures a feed directly into the buckets. Other manufacturers accomplish the same results in different ways.

These conveyors have the widest range of usefulness. They can be arranged to work at any desired angle and make any desired turn in the same vertical plane. They can transport ore horizontally, then vertically, and then horizontally again, and discharge anywhere on the line. They operate noiselessly and require comparatively little power and very little attention. Repairs and renewals are very low indeed. The capacity is large, depending of course on the size of the buckets and their speed. Unfortunately the first cost is also large. Thus, a conveyor of first class manufacture, with 18 by 24-in. buckets, running at 10 ft. per minute, which would have a capacity for 10 tons of ore per hour, would cost about $3,600 for a 100-ft. length, this cost including the driving mechanism and electric motor. This is much more costly than any other form of conveyor that has been described herein. However, probably only about 1 h. p. would be required to drive it, and repairs and renewals over a considerable period of years ought not to average more than 1 or 2 per cent per annum on the first cost. Such low figures are actually attained in practice. These conveyors are therefore to be recommended for important installations wherein belt conveyors cannot be used, where the first cost is a minor consideration and the assurance of certainty in operation is an essential.

QUICKSILVER IN TURKEY.—It is reported that an English company has secured a concession for the exploitation of quicksilver deposits near Akhiri, on the peninsula of Karaburum, west from Smyrna.

OSMIUM LAMPS.—F. G. Baily in giving his experiments (*Electrician*, 1904) considers that though the low resistance of the osmium lamps render them inconvenient for use as single lights, yet their high efficiency (1.9 watts per candle at the normal E. M. F. of 55 volts) may allow of their being used advantageously in place of carbon-filament lamps, when groups of lights are required. Wedding found, while ascertaining the life of the osmium lamp, that of 18 lamps, the average life was over 1,900 hours, and some lasted even upward of 4,000 hours. Considering this, the osmium lamp has at least double the efficiency of the carbon lamp under equivalent conditions. The osmium lamp gives a white light.

THE ANTHRACITE COLLIERIES OF THE GIRARD ESTATE.

The report prepared for the Philadelphia City Trusts on the coal property of the Girard Estate, by Mr. Heber S. Thompson, the engineer in charge, always presents many points of interest. The Girard collieries last year produced only about 2.5 per cent of the total shipments of anthracite coal; but they include several important collieries, which are leased to different companies, so that they may be taken as representative of a large section of the anthracite region; while the report gives some data not accessible elsewhere.

The coal producing operations on the Girard estate are 13 in number, of which two are classed as washeries, because they are exclusively engaged in working old culm banks; but of the 11 classed as collieries the product of two last year came almost entirely from the culm banks, and five others materially increased their output from that source.

Two features in connection with mining operations on the estate are worthy of note; the general enlargement and improvement of plants, and the development of all possible sources of supply, the latter being shown in the testing and working of small beds of coal formerly considered of no value. In 1903 two new breakers were put in operation, while a third was under construction, and many other improvements were made. A special feature has been the erection of larger steam plants and an increase in pumping capacity. This was largely the result of the floods of the winter of 1901-1902. A marked advance has also been made in reducing the danger from fire. Pump-houses and engine-houses are now made fireproof, and other surface buildings are made more substantial than formerly.

With regard to pumping, Mr. Thompson estimates that in ordinary times there is pumped or hoisted each day from the collieries on the Girard estate 8,000,000 gal. of water, which is over seven tons of water hoisted for each ton of coal mined. The steam plants on the estate have a total rated capacity of 14,670 h. p., the largest being 2,500 h. p. at Packer No. 4, and the next 2,400 h. p. at Hammond colliery.

The total coal mined or saved from the estate, and the disposition of the same, was as follows, in long tons:

	Tons.	Per ct.
Mined from collieries	1,236,738	72.7
Saved in washeries	464,932	27.3
Total	1,701,670	100.0
Shipped to market	1,515,214	89.0
Consumed in operating	186,456	11.0
Total	1,701,670	100.0

No comparisons are made here with 1902, on account of the exceptional conditions prevailing during that year.

An interesting table given in the report shows the quantity and percentage of each size of coal shipped during each year from 1877 to 1903. This shows a very great growth in the saving and shipment of the small sizes of coal. In 1877, 90.8 per cent of the total shipments were of the large sizes, that is, chestnut and over, while 9.2 per cent was pea coal. Buckwheat was first shipped in 1878, amounting then to less than 1 per cent of the total; and this remained the smallest size until 1895, when the first shipment of rice coal was made. Again, in 1901, the fourth steam size, barley, was added, which is now an appreciable percentage of the total. Of course, the proportion of small coal shipped by the washeries is greater than that forwarded from the collieries. The coal used in operating also is almost entirely of the steam sizes, or is culm. The following table shows the division into sizes of the 1,515,214 tons shipped to market from the Girard estate by the various companies last year. As shown above 1,050,282 tons of this coal were freshly mined, and 464,932 tons were washed coal saved from culm banks:

	Collieries.	Washeries.	Total.
Lump	0.29	.....	0.20
Steamboat	3.86	.....	2.67
Broken	9.61	.....	6.66
Egg	13.23	1.03	9.49
Stove	18.46	3.87	13.98
Chestnut	21.30	8.84	17.48
Total large sizes	66.75	13.74	50.48
Pea	11.72	18.72	13.87
Buckwheat	15.29	35.87	21.61
Rice	6.23	26.86	12.56
Barley	0.01	4.78	1.47
Culm	.....	0.03	0.01
Total steam sizes	33.25	86.26	49.52
Totals	100.00	100.00	100.00

The table above shows that very nearly half the coal shipped to market was of the steam sizes, pea and under. If we add the sizes used in operating, it is probable that more than half the coal used was small coal.

The report contains an interesting account of the various improvements made by the companies leasing the collieries. The total royalty paid by these companies to the estate in 1903 was $400,560; other receipts from house rents and miscellaneous sources brought the income of the estate from its coal property up to $419,153.

The most important improvements made during the year were at the Packer No. 4, which is leased by the Lehigh Valley Coal Company. The most interesting work done in the development of the thinner beds of coal was at William Penn, leased by the Susquehanna Coal Company, where work is now progressing in the Primrose, Little Buck Mountain, and other beds which were formerly considered of no value. The largest washery is Schuylkill No. 1, leased and operated by the North American Coal Company, which last year shipped 174,087 tons. At this washery hydraulicking is used to wash down the old culm banks and carry the coal to the washers. The extending of the work here may be estimated by the fact that the daily output of washed coal averaged 661 tons. Another large washery is the Raven Run, leased by the Raven Run Coal Company. The old system of hydraulic conveying has been dropped there, and the culm is now loaded into mine cars by a steam shovel and hoisted up a plane to the washer.

Briquette Plants in California.—In a previous issue reference was made to the existence of a plant for briquetting lignite in California. It is now stated that a second plant for the same purpose is under construction, near San Francisco, and that a third one will be built shortly for the Western Fuel Company on the plans and under the direction of Mr. Robert Schorr. Mr. Schorr's latest design for a continuous machine will be used in this plant, for the manufacture of 4-oz. cylindrical briquettes. The plant will have a capacity of about 350 tons per 24 hours. Asphaltum pitch will be used as a binder. Investigations are also being made as to the manufacture of petroleum briquettes, which is contemplated on a large scale.

SLIME TREATMENT IN THE JOPLIN REGION.*

By W. R. CRANE.

The methods of milling employed in the lead and zinc region of Missouri and Kansas may be termed coarse concentration. The extreme brittleness of both galena and blende, especially when associated with a tough gangue, causes excessive sliming, rendering difficult any close extraction without the use of special apparatus.

Sand jigs were first employed to reduce the loss by sliming; following which, tables, buddles and hydraulic classifiers (spitzkasten and spitzlutten) were introduced, until at the present time the use of these devices has become the rule throughout the district. The systematic treatment of slimes was undertaken at an earlier date near Joplin and is now more commonly practiced there than in the Galena district, although during the last few years there has been a more rapid development along this special line of work in the latter locality.

Special concentrating plants, commonly known as 'sludge mills,' have been designed for the treatment of tailings, sand, and slime, resulting from poorly constructed mills or careless treatment of ore. One of the first of these was designed, built and operated by Emmons & Crowe; this mill is still in operation, as are several others of similar design. The latest sludge mill to begin operations in the Galena district is owned and operated by Murphy & Friel; it is situated almost within the city limits of Galena. See Fig. 1. As this plant has the usual slime-treating apparatus common to such mills, and presents also several new features, especially with respect to special apparatus for treating low-grade and refuse materials obtained from the waste banks of the standard concentrating mills, it may be taken as typical of the district.

FIG. 1. MURPHY-FRIEL SLUDGE MILL.

The mill consists of three parts: the power plant, the tailings mill, and the slime department. See Fig. 2. The power plant consists of two boilers, an 80-h. p. Erie, and a 100-h. p. Freeman, which are fed by a Snow pump, with suction and discharge of 1.5 and 1.25 in. respectively. Directly behind the boilers is the supply-tank, which is connected with the city water-works. These boilers furnish power for two Erie engines, which have 12 by 18 in. and 11 by 16 in. cylinders respectively, and a small engine (5 by 7 in. cylinder) for driving a generator. The larger of the Erie engines drives the main line-shaft in the tailings mill, while the smaller drives the machinery in the slime department and a centrifugal pump in the tailings mill. The generator is a No. 1, Triumph Electrical Company make, runs at 1,300 rev. per min., produces 24 amperes at 125 volts, and maintains 100 incandescent lights for the illumination of the plant.

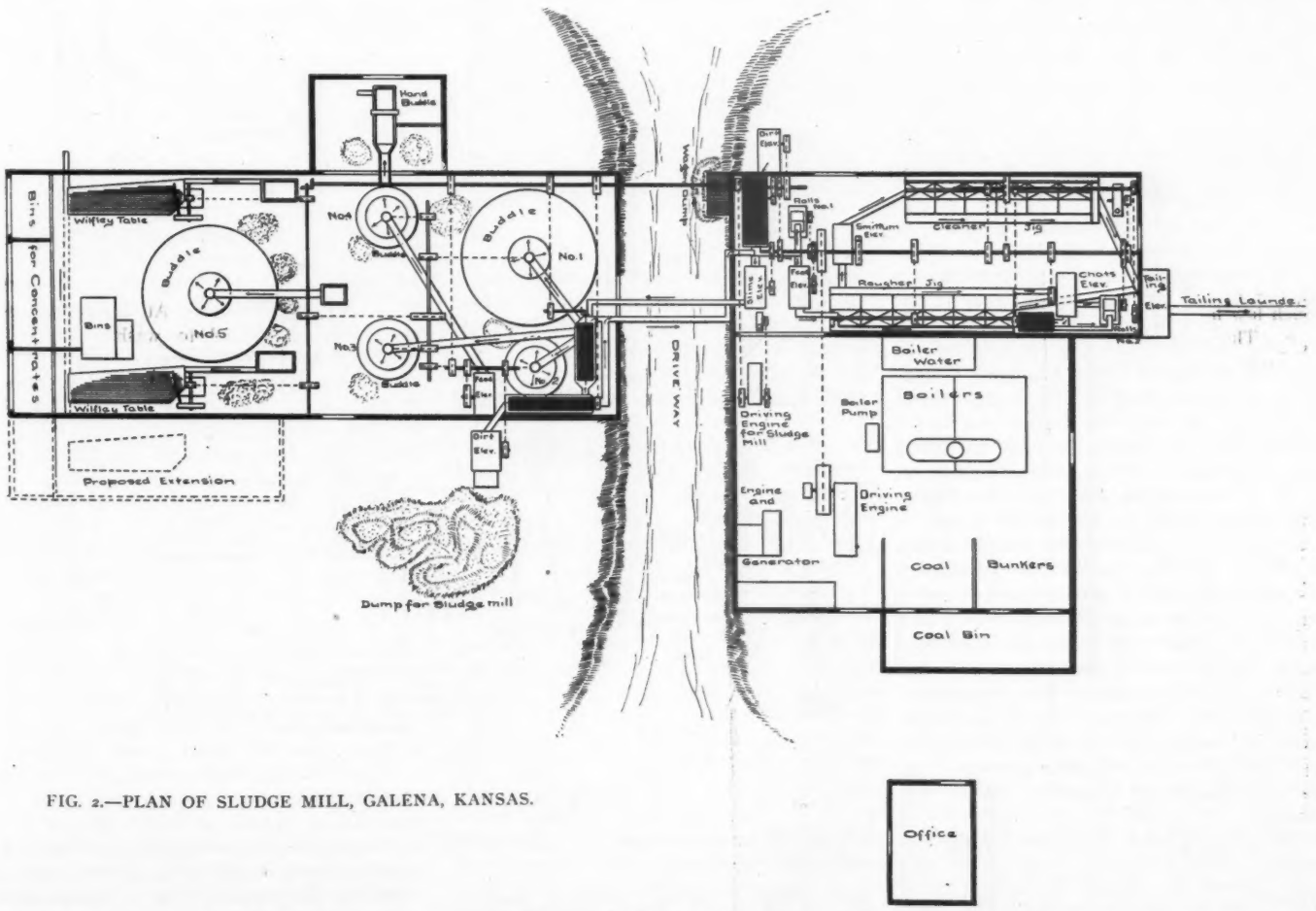


FIG. 2.—PLAN OF SLUDGE MILL, GALENA, KANSAS.

Directly to the rear of the power plant is the tailings mill. The rolls are of the Cornish

*Data collected principally while working for the University Geological Survey and published by permission of the director.

type, 20 in. diam. and 12 in. width of face. Both No. 1 and No. 2 rolls are run at 50 rev. per min. There is only one trommel, which receives the discharge from the chats elevator; the dimensions are 36 in. diam. and 48 in. long; the trommel is covered with perforated metal having 1 mm. round holes, and runs at a speed of 20 rev. per min. A flat screen, 3 ft. wide by 10 ft. long, receives the discharge of the dirt elevator, and is provided with perforated metal having 0.75 mm. round holes.

There are two jigs, a rougher and a cleaner; the former has six 30 by 48-in. cells, which are fitted with 5-mesh brass wire-screens; the latter also has six 30 by 48-in. cells, which are fitted with 6-mesh brass wire-screens. The length and number of strokes in the two jigs are 1 in. and 0.75 in., and 75 and 125 per minute (150 and 250 rev. per min. of jig-shafts) respectively. All the plungers of each jig are run at the same speed; that is, the shafts are not broken.

Owing to the difficulty experienced in handling large quantities of low-grade tailings on an ordinary multiple-cell jig, a slight modification was made in the construction of the rougher jigs, by putting in high transverse partitions, thus changing from a multiple 6-cell to a 6-cell single-acting jig. See Fig. 3. The product fed to the jig, instead of passing from one cell to another until the full length of the jig has been traversed, is fed to each cell separately, and on passing that cell leaves the jig. The advantage of guard-cells is thus eliminated. Three products—over-flow, discharge and hutch—are also obtained with this jig, and are probably cleaner than those otherwise produced. This jig is not claimed to be useful in handling other than low-grade minerals, but with such and waste products from coarse concentration, it seems to answer the purpose.

The following table gives data for the elevators:

Purpose.	Kind.
Dirt	Belt and Bucket
Slime	" " "
Feed	" " "
Smittem	" " "
Chats	" " "
Tailings No. 1	" " "
Tailings No. 2	" " "

There are two centrifugal pumps in the tailings mill: No. 1 furnishes the mill with water, drawing its supply from the dam, and has suction and discharge 6 and 5 in. respectively, being driven at a speed of 1,500 revolutions per minute; No. 2 handles the discharge from the cleaner jig, has 4 in. suction and 3 in. discharge, and runs at a speed of 800 revolutions per minute.

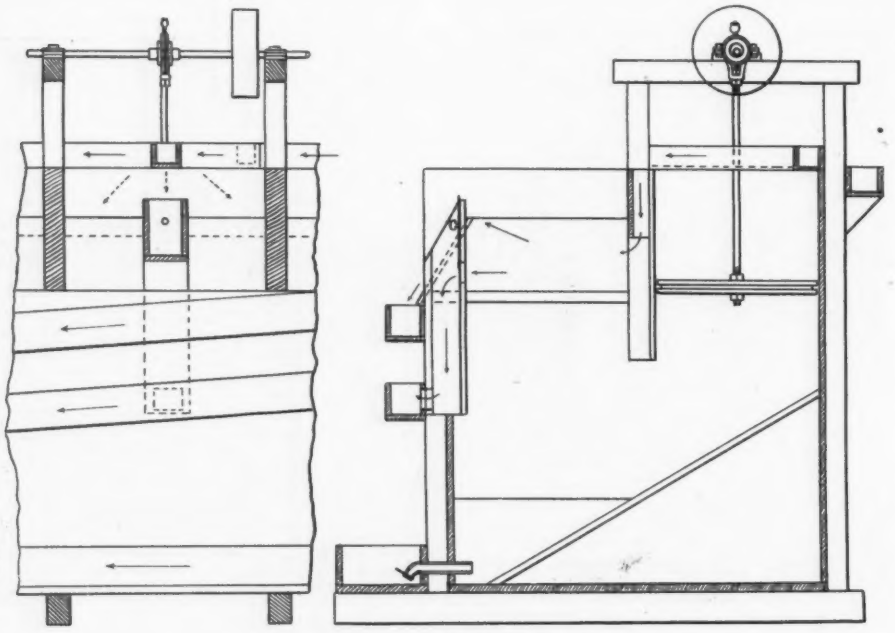


FIG. 3. TAILINGS JIG.

Plan ft.	Height ft.	Bucket in.	Batter in. of ft.	Speed ft. per min.
3 by 10	18	6 by 10	1 to 1.5	300
3 by 12	18	6 by 10	1 to 1.5	300
3 by 10	18	5 by 8	1 to 1.5	300
3 by 10	10	5 by 8	1 to 1.5	300
3 by 10	10	5 by 8	1 to 1.5	300
4 by 16	55	6 by 10	1 to 2	300
4 by 16	35	6 by 10	1 to 2	300

Projecting into the drive-way which separates the tailings-mill from the slime department, a grizzley is placed horizontally and level with the ground. This grizzley is 3 by 6 ft. in plan, is made of 1.5-in bars, spaced 1.5 in. apart, and receives the material fed to the tailings-mill.

The slime department receives a portion of the material from the tailings-mill, as does the latter from the slime department, the two parts being connected by launders.

The concentrating apparatus installed in this portion of the plant consists of buddles, tables and trommels. See Fig. 2.

There are two large convex buddles, of 20 ft. diam. with 6-ft. drums and distributing aprons. The bottoms of the buddles have a slope of about 1 in. to the foot; each has 6 sweeps which are driven at a speed of 6 rev. per min. One of these buddles is employed as a rougher, the other as a cleaner; the former has the pit raised above the floor, for convenience in handling the products, while the latter is sunk below the floor. Besides these large buddles there are three (two 9 ft. and one 7 ft.) all metal buddles of a new design, and but recently patented. The drums of these are of 6 ft. diam., while the buddles proper are 9 and 7 ft. respectively, thus leaving only an 18 and 12-in. annular space for the collection of slimes. The rims are made of sheet metal and have a vertical adjustment of 10 in., produced and controlled by the driving mechanism. The upward movement of the rims can be varied at will, being fast or slow as the mineral treated varies in richness; the usual rate is 2 in. per hour. There is no deep basin in which waste material can catch and accumulate, and an even flow is also secured radially from the centrally placed distributing apron. These buddles stand on metal legs some distance above the floor and are therefore easily accessible. At present they are

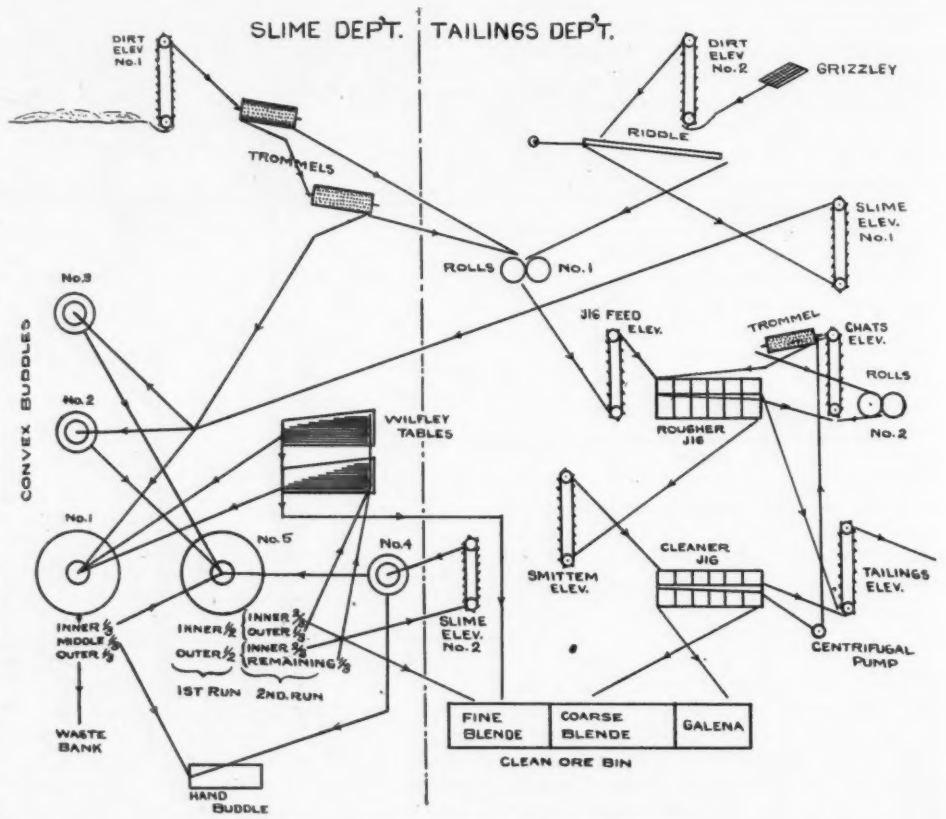


FIG. 4. DIAGRAM OF SLIME TREATMENT.

employed as roughers only, and all of them are driven at a speed of 14 rev. per min. A 3 by 12-ft. hand-buddle is employed in conjunction with the power buddles; this treats complex residues coming from the roughers.

Two Wilfley tables are installed in this department and another one is to be added shortly. The tables are run at a speed of 225 strokes per minute and are the finishers of the plant.

Two trommels handle the discharge from the dirt elevator; the first in the series is a 9-ft. jacketed screen with diameters of outer and inner drums 48 and 30 in. respectively. They are covered with perforated metal screens having 6 mm. and 1 mm. round holes. The undersize from this trommel goes to another trommel; this is 10 ft. long, has a 36-in. diam. and is covered with perforated metal with 0.75-mm. round holes. The oversizes from both trommels unite and pass to the tailings-mill; the speed of both is 20 rev. per minute.

In connection with the slime department there are two elevators: the dirt elevator, situated without the building, is 4 by 10 ft. in plan and 20 ft. high, while the fuddle-feed stands within the building and is 3 by 8 ft. in plan and 16 ft. high. They are bucket elevators, as are all others in the plant, with buckets bolted to rubber belting and they are driven at a speed of 300 ft. per minute.

The scheme of treatment is shown in the accompanying diagram, Fig. 4.

The minerals treated by this mill are varied, and come from all parts of the Galena portion of the district, even being hauled from four to five miles. The price paid varies both with value of mineral and length of haul. Tailings are seldom hauled more than three-fourths of a mile, while sands are hauled from two to three miles. The prices paid for rich sands, tailings, and poor sands and dirt are 25, 15, and 10c. per ton respectively; about 1c. is added per ton per mile.

The capacity of the mill for rough material per day of 24 hours is close to 120 loads of tailings, about 4,600 lb. per load, and 60 loads of sand, 5,000 lb. per load. The per cent. of mineral in tailings and sands is 1.5 to 3 and 3 to 5 (even up to 10) respectively.

The waste product from the tailings mill is raised by two bucket-elevators, which act together: the first raising to a height of 55 ft. and delivering to the second, which is 35 ft. high and is 120 ft. distant from the first. It also stands 35 ft. above the ground. The total lift is then 90 ft., while the lateral transfer is 120 ft. to the center of waste bank. See Fig. 1. The second elevator is driven by a 16-h.p. engine, connected with the main power plant.

That there is also considerable waste from the sludge mills is apparent from the amount of flour-blende covering and bordering the sand banks of the streams below the mills. The cause of such loss is mainly due to the speed of handling large quantities of low-grade material, coupled with the lack of efficient and economical slime treating apparatus, such as hydraulic classifiers and similar devices.

Good milling practice, however, dictates that such savings should be effected in the main concentrating mills rather than in special mills designed for handling the waste products of the former, and the construction of the latest mills shows a tendency to follow these lines.

A layer of carborundum paste 2 mm. thick will, it is claimed, protect furnace bricks against the varying high temperatures.

A NEW QUICKSILVER MINING DISTRICT.

By M. P. Kirk and J. W. Malcolmson.

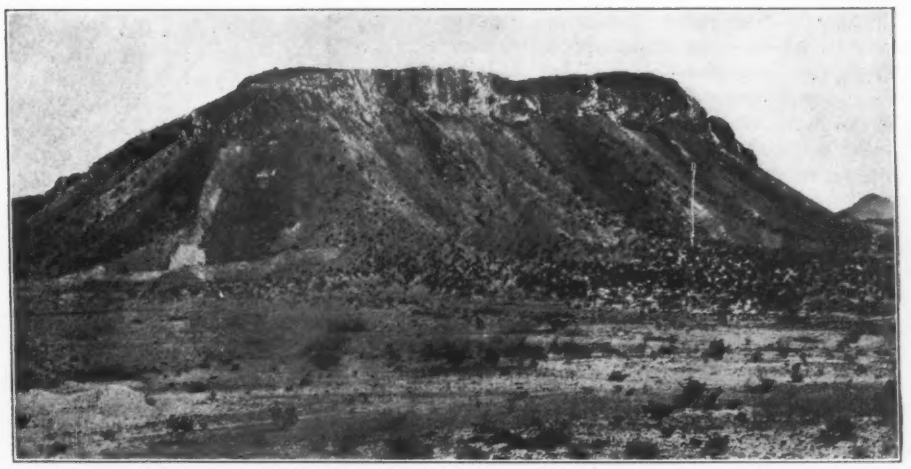
Until quite recently the bulk of the quicksilver mined in Texas has been from the mines of the Marfa & Mariposa Company, of Terlingua, which has been shipping approximately 400 flasks per month for over two years. The ore-bodies worked by this company are found in Cretaceous shale lying immediately over the Cretaceous limestone which forms a low-lying hill known as the California mountain, at Terlingua, Brewster county, Texas.

Although the Texas quicksilver fields have only been exploited during the past four or five years, considerable development work has already been done, and the district now appears to be on a fairly solid basis, as regards future production and the permanent character of the ore-bodies. During the past twelve months a large amount of prospecting work has been done on all sides of the known mineralized area, even extending over the Rio Grande into the Republic of Mexico. This work has already been rewarded by the discovery of a very promising zone of mineralization 11 miles to the east of the Marfa & Mariposa ore-bodies. The new district is in a slightly different formation; the ore impregnations being found in an igneous rock overlying the sediments described by Prof. Benjamin F. Hill as rhyolitic lava as follows:

"East of Terlingua creek on Section 216, Block G4, are prospects showing cinnabar in an association slightly different from the ordinary types. The rocks involved are the thin-bedded sediments of the Eagle Ford formation, including limestone, shale, clays and marls, all of which are capped by a flow of rhyolitic lava. In the limestone underlying the lava, in the clays underlying the limestone, and in the lava itself are numerous veinlets of cinnabar often unassociated with any other mineral. The discovery of these deposits has only recently taken place, and up to the present no distinct vein has been discovered. The presence of the veinlets in the rocks, however, would indicate that an ore channel as yet undiscovered has been connected with them. The cinnabar, which is generally crystalline, is of a dark color and is unaccompanied by native mercury. In the clay shales considerable marcasite is present. The limestone immediately underlying the lava cap has been metamorphosed, but still contains considerable quantities of bituminous matter. The rhyolite is badly shattered and decomposed. The cinnabar in it occupies minute spaces from which some of the material forming the rhyolite has been dissolved and removed." (*Bulletin* No. 4, University of Texas Min. Survey, October, 1902.)

The ore occurs in the shape of numerous veinlets, which, although of limited importance in themselves, have resulted in the impregnation of the country rock to such an extent that profitable operations can be carried on, mining what is apparently country rock for a total width varying from 4 to 25 ft. The veinlets extend over an area of approximately 200 acres and run in all directions, the larger number having an east and west strike dipping toward the south.

The work done during 1903-1904 has demonstrated that the ore impregnation continues to the depth reached of 150 ft. and to date 5,000 ft. of drifting and 1,000 ft. of sinking have been attended with very encouraging and satisfactory results. The ore opened up is low in grade, tonnage assays ranging from 0.25 to 2 per cent quicksilver, and it has now been demonstrated that several thousand tons of ore can be mined with an average assay of 0.60 per cent.



STUDY BUTTE, BREWSTER COUNTY, TEXAS.

The new district has been named the 'Big Bend' after the immense turn to the north taken by the Rio Grande, 12 miles farther south, that river forming the boundary between the United States and Mexico. The district suffers at present from lack of transportation facilities, the nearest railroad point being Marfa, Texas, on the Southern Pacific railroad, 104 miles north. Freight rates to Marfa are $10 per ton. Water and fuel are more abundant than at the older discoveries in Terlingua. Mexican labor can be secured for $1.25 per day. The extension of the Kansas City, Mexico & Orient railroad through Texas to the Rio Grande will pass within 60 miles of this field and will materially aid in its development.

The cost of mining the ore already in sight should not exceed $3 per ton, not including development. At Terlingua, the cost of treatment in Scott furnaces is $0.75 per ton with an extraction of over 90 per cent of the mercury contents of the ore. A yield of 0.6 per cent of quicksilver or 12 lb. per ton of ore is worth $6.60, f. o. b. Marfa, so that it will be seen that after deducting loss, treatment, mining, freight and all other charges, a very good profit on operations is assured. A good deal of work is now being done in the camp. The

Big Bend Cinnabar Mining Company has already commenced work on a Scott furnace of 50 tons daily capacity, as there is a fairly large tonnage of ore in sight, and the Dallas Mining Company is rapidly opening up new ground of value. The outlook for the future of this district is promising.

COAL-MINING MACHINES IN AUSTRALIA.—A recent consular report notes the introduction of a number of coal-mining machines into the collieries in the Newcastle district, in New South Wales. Most of the machines are of American manufacture.

A LARGE ORE CARRIER.—The steamship *Augustus B. Wolvin,* recently launched from the Lorain yard of the American Shipbuilding Company, is now the largest coal and ore carrier on the Lakes. She is 560 ft. long over all, 540 ft. on keel, with a beam of 56 ft. molded at the widest part, and a molded depth of 32 ft. amidships. The cargo hold is built in the form of a hopper, with sides that slope from the main deck down to the tank top and the ends built on the same slope. The hopper extends in one continuous length of 409 ft., without bulkheads or divisions of any kind, and in width it measures at the top 43 ft., and at the bottom 24 ft. The space between the sides of the ship and the sides of the hopper is used for water ballast. This construction was adopted to accommodate the use of automatic clam shells in unloading the cargo, and it also serves to make a stronger vessel. There are 33 cargo hatchways on the spar-deck, each one measuring 33 ft. by 9 ft. in the clear, and spaced 12 ft. apart centers, so that it will be possible for the clam shells to unload the vessel entirely without any hand shoveling. The water ballast space is divided into numerous compartments by water-tight bulkheads fitted at intervals of about 60 ft., and the total ballast capacity is about 8,000 tons of water. The cubic capacity in the cargo-hold is about 500,000 cu. ft., which is equal to 401,000 bush. of grain, or to 12,500 tons of coal. On the spar-deck are six 8 by 10-in. single-drum engines, carrying each a steel wire mooring line for the usual mooring and warping purposes.

The propelling machinery, as is usual in lake vessels, is located in the extreme after end of the boat. The main engine is of the quadruple four-crank type, with cylinders 18.5 in., 28.5 in., 43.5 in. and 66 in. diameter, each having 42-in. stroke of pistons, and they are designed for an indicated horse-power of 2,000 when making 80 revolutions per minute. The valves of the high, first and second intermediate are of the piston type, placed in front of their respective cylinders, and driven by Joy radial valve gear. The low-pressure cylinder is fitted with a double-ported slide valve on the after end, operated by double-bar Stephenson link motion. The bed-plate is of the girder type, of box section, in two pieces, bolted together, and has five main bearings lined with white metal. The boilers, two in number, are of the Babcock & Wilcox type, and placed with a 12-ft. space between them to fire athwart-ships. The working pressure is 250 lb. per square inch, and the steam is superheated, the superheater being placed on top of boiler proper. The boilers are fitted with mechanical stoker and induced draft, having two fans 7 ft. 6 in. diameter, driven by double high-speed engines, with 6 by 5-in. cylinders.

CAUSES OF EXPLOSIONS IN AIR COMPRESSORS.*

By E. Goffe.

The following is a brief description of the conditions under which explosions have occurred recently on the Rand:

In one case there are two compressors working side by side, a horizontal twin tandem-compound steam and two-stage air (Walker), having 13 in. and 26 in. diam. (two each) steam cylinders and 24 in. and 38 in. diam. air cylinders, all 48-in. stroke, speed 25 rev. per min.; and a horizontal cross-compound steam and two-stage air (Riedler), having 20 in. and 34 in. diam. steam cylinders, and 20 in. and 33 in. diam air cylinders, all 48-in. stroke, speed 68 rev. per min. Each compressor is jacketed and has inter-cooler, and delivers air to a common receiver.

At 5.30 p. m. on Saturday, September 26, 1903, while both compressors are running full, the driver sees a flame burst from the high pressure air-delivery pipe connecting the heads on the Reidler; this is followed by dense smoke. Both engines are stopped as quickly as possible, and on examination it is found that the T-branch leading away from the cylinder is cracked right round, practically broken off. The packing is blown out of the joints, and general signs of burning are visible. A lot of deposit is found in the valve-chambers and cleared away. No smoke is reported as being delivered to the drills in the mine. This may be accounted for by the fact that on starting up again after repairs it is found that a valve on the air-main or shaft is chocked with the same deposit. Temperatures of the air, etc., at the time are not available, but immediately on resuming running, and when under the same conditions, a temperature of 325° is found in the high-pressure delivery, with air pressure of 75 lb. The cooling water is not obtainable under 118° F. The usual lubrication of cylinder up to the time of explosion is a mixture of one part of valvoline oil to nine parts of soapy water, which is perfectly satisfactory, judging by the condition of bore of cylinder and of the valves. The air intake is, as usual, an opening on valve-chest, protected by coarse wire netting. The Bristol recorder has made no indication of any excess of pressure at the moment.

In another case there are three independent compressors working together, serving into one main leading to a receiver from whence the supply goes to the shaft. The sizes of the compressors are:

1. Vertical (King-Riedler) 19 in. and 30 in. diam. steam cylinders, 20 in. and 32 in. air cylinders all 42-in. stroke, speed 80 rev. per min.

2. Vertical triple-steam and two-stage air (Vulcan) with 14.5 in., 23.625 in., and 35.5 in. diam. steam cylinders, and 18 in., 23 in., and 23 in. diam. air cylinders, all 35.5-in. stroke.

3. Horizontal cross-compound (Ingersoll-Sergeant) with 18 in. and 34 in. diam. steam cylinders, and 18.25 in. and 30 in. diam. air cylinders.

All the air cylinders are water jacketed. The relative position of the compressors is such that the delivery pipes form a T, with the King-Riedler and Ingersoll at either end of the top member, and the Vulcan between them close to the branch which leads to the receiver just outside the engine house. There are two safety valves on the air-pipe, one close to the King-Riedler and one close to the Vulcan, as well as one on the receiver outside.

At 1 a. m. on November 24, while all three compressors are working at ordinary full speed against a gauge pressure of 68 lb., the driver, who is standing by the King-Riedler, sees flames burst from both safety-valves, extending up to the roof, this being followed by dense smoke, which fills the whole place. A similar flame comes from the safety-valve on the

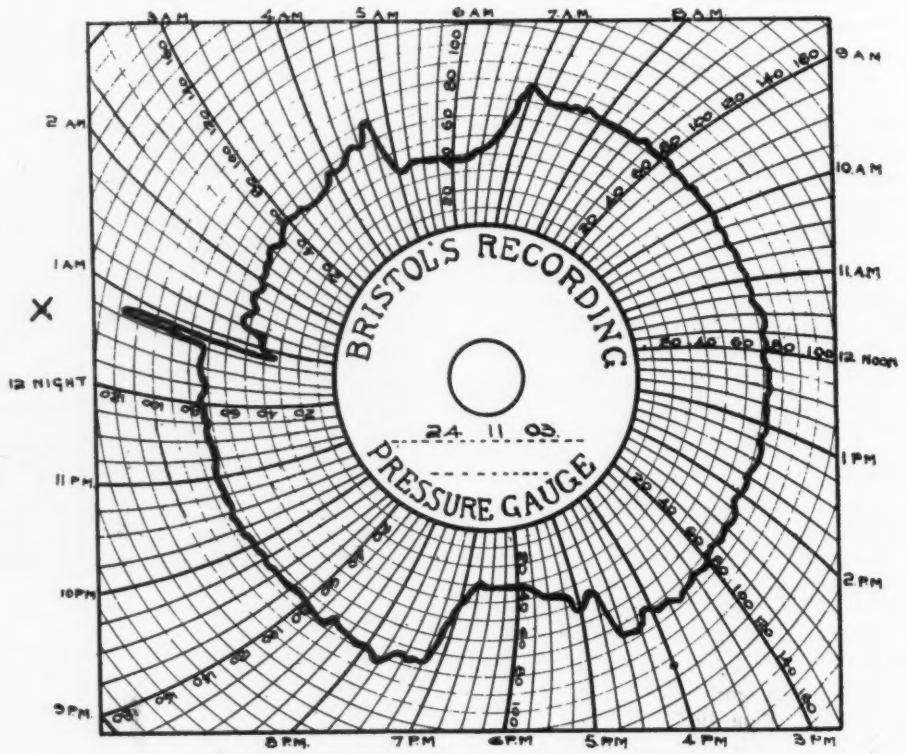


Diagram showing Rise of Pressure at Moment of Explosion.
X Pressure due to Explosion.

*Abstract from *The Journal* of the Mechanical Engineers' Association of the Witwatersrand, February, 1904.

receiver. He immediately slows down the engines, and no further development occurs. The Bristol recording gauge shows a sudden and momentary rise of pressure to 120 lb. The resulting damage is found to be that all paint and grease are burnt off the outside of the delivery pipe from the King-Riedler to the branch of the Vulcan, thence along to the receiver. The outside of the receiver is burnt in a similar manner, and the mine pipe as far as the collar of the shaft. All the soft packing on the valve-stems of the air cylinders of the King-Riedler is burnt out, and a charred residue is found afterward in the valve-chambers. A sample of this deposit is now being analyzed.

Smoke is reported as having been delivered to the machines in the mine. There are no marks and no evidence of the flame having struck back to either the Vulcan or Ingersoll compressors.

The oil used on these compressors is high-grade, with a flash-point of 494° F. The quantity used by the three, that is for air cylinders alone, is one gallon per 24 hours. The method of oiling the King-Riedler air cylinders is with a pump-lubricator, having leads to each valve-stem, etc. The driver, on coming on shift, opens each cock on the various oil-leads in turn, and gives two or three strokes of the pump, feeding probably as many ounces of oil at a time which has to serve for some hours. There are sight-feed lubricators also fitted to the covers. No soft soap or soapy water is ever used. The valves are taken out and examined regularly fortnightly, and forks adjusted.

The temperatures of the air at the time of the explosion are not known, but from observations taken by me during several weeks immediately after, at times of greatest output, the maximum observed was 290° F. in the high-pressure delivery, with 264° F. in the low-pressure delivery, both taken close to the delivery-valves.

The first-stage air, by passing through the inter-cooler, is cooled down to between 80° and 90° F. The jacket water is ample and always cold, the difference between the inlet and outlet being only just sensible to the touch. The air intake to the King-Riedler is entirely from the engine room, is fairly high up, and ranges in temperature from 90° F. to 102° F.

I have knowledge of three other explosions which took place earlier in the year at other mines. The conditions and experiences are similar, and all happened with two-stage compressors. The oil used in one case was submitted to me for testing, and the flash-point was found at 550° F. (open flash).

Now, it is evident that there must be two factors before an explosion or flashing can take place; first, an explosive mixture; second, a temperature sufficiently high to explode this mixture. To account for the formation of an explosive mixture, the oil used is usually the first thing blamed. If an ordinary lubricating mixture is in use this may be justifiable, but so much depends on the conditions under which the compressor is run. I have in mind one compressor, close at hand, in which the engineer uses ordinary good engine oil, in quantities not exceeding two drops per min. per cylinder, and has never had the least trouble with it; the valves keep perfectly clean and never stick. But that compressor is a slow running one, about 40 rev., is amply large for its work, works only 10 hours per day, has good cooling water, and delivers its air to the receiver at about 120° F. Air pressure is 70 lb. The writer has not tested the temperatures close to the delivery valves, but it is evident from inspection of the valves that there is no trace of decomposition of the oil on them.

In the case previously mentioned of a compressor using a high-grade oil with flash-point of 494° F., and in which the highest observed temperature of the air was 290° F., there would appear to be an ample margin of safety unless the decomposition of oil takes place much more readily under pressure, which, if not already proved, should be easily demonstrated by a laboratory experiment. It is always possible, of course, for a careless driver to use an inferior oil, or even a dose of paraffin in the air cylinder, but it is possible to guard against that by having only the one oil accessible to him while on the engine.

A small proportion of foreign oil, together with other matter, might find its way into the air cylinder by means of the piston rod. Many air cylinders are arranged tandem, with the steam cylinder using the same rod, which, for part of its length, is alternately in each cylinder.

As usually arranged, an air compressor is an excellent dust trap, with its open inlets, frequently opposite an open door through which comes all its air, laden with dust, a good proportion of which will be probably coal dust, the boiler-house and coal bunkers naturally being near by. The coarse wire-screens prevent ordinary portable articles going into the valve chamber, but that is all. In the recess of the valve-chambers, ports, air-pipes, inter-cooler, and receiver, this dust will accumulate, making with the oil a pasty, gummy mass, which will stick fast. In one case here this mass had accumulated about the valve on the air main from receiver, and the air could never be delivered to the mine within about 20 lb. of the gauge-pressure at compressor, and it was not until an explosion occurred and the pipe system had to be overhauled that the reason for the constant difference in pressure was found. Now they get air in that mine.

It is probable that even a high-grade oil, mixed up with coal dust and foreign matter, including metallic particles, and exposed to a temperature considerably below its original flash-point, under pressure for months or years, will arrive at a decomposing point and produce an explosive gas or other mixture. Then, given favorable conditions otherwise, a hot intake, failure of cooling water, etc., an explosion will probably occur.

Considering now the second condition for starting an explosion—the temperature attained—it has been well shown by some calculations made by Mr. Hill, of Norwalk, Conn., that leaks through the pistons and valves of air cylinders are able to produce much higher—in fact, dangerously higher—temperatures than can be calculated upon in the ordinary way, and in single-stage compressors well overlapping the flash-points of many oils. In two-stage compressors this danger is much reduced, but still much higher pressures than normal may be reached. The effect of these leaks on ultimate temperature is, naturally, the same as of a high temperature of the intake, or of an inefficient inter-cooler, and the starting temperatures being known the resulting temperatures are calculable in the usual way.

It would be interesting to know whether the calculated temperatures of compression are all that are reached to, or whether under some conditions pressures are reached in cylinders higher than any that are expected. The usual method of thermometer tubes in the air-pipes gives a sufficiently accurate reading of the temperature of the air passing through, but ordinary thermometers would not show the varying temperature conditions in the cylinders. What would be required for that would be an extremely sensitive instrument which would register every variation instantly, and record it.

After examining the conditions under which those explosions in air compressors have taken place which have been brought to my notice, I conclude, therefore, that the principal cause is the presence of accumulated dust in the interior of the valve-chambers, pipes, and receivers. This dust absorbs the excess of oil, and the resulting mixture decomposing will give off explosive gases, which, on the occurrence of favorable circumstances, will be ignited, probably by the glowing of some of the more easily combustible portions of the dust.

THE AUTOMOBILE AS A HELP TO MINING.

Since transportation is one of the important factors in successful mining, the introduction of the automobile for this purpose is suggested. For traveling over high altitudes in quick time and safely, it has been shown recently by experiment in Colorado that the automobile, driven through mountainous regions, covered a distance of 175 miles at a little less than 20 miles an hour.

Now an attempt is being made to prove the superiority of the automobile for traversing the great desert of Death Valley, California, which is 167 miles long, and where for many years the mule has been considered practically the only means of locomotion. The Pacific Coast Borax Company is using the novelty at its mines. At present it takes a 20-mule train, hauling 20 tons of crude borax, 24 hours to travel only 18 miles. The automobile train, having power equivalent to 30 mule teams, will carry five times the quantity and run a distance of 100 miles in 24 hours. Power for the automobile train will be supplied by a 275-h.p. triple-cylinder gasoline engine, operating a 100-kw. electric generator, and weighing in all only six tons. There will be at least seven or eight cars to a train, and each car will be equipped with an electric motor. The whole train will be under complete control of the motorman in the cab of the engine, which is also furnished with an air compressor to operate the brakes on each car. A searchlight will facilitate work at night.

MINERAL IMPORTS AND EXPORTS OF SPAIN.—Imports of fuel into Spain for the two months ending February 29 were 350,891 tons of coal and 29,057 tons of coke. Exports of minerals for the two months are reported by the *Revista Minera* as follows, in metric tons:

	1903.	1904.	Changes.
Iron ore	1,232,121	1,074,641	D. 157,480
Copper ore	124,573	157,800	I. 33,227
Zinc ore	25,235	18,949	D. 6,286
Lead ore	520	1,663	I. 1,143
Pyrites	91,555	64,983	D. 26,572
Salt	39,794	52,204	I. 12,410

Exports of metals were 5,560 tons pig iron, against 5,318 in 1903; 5,147 tons copper, against 5,310 in 1903; 306 tons spelter, against 309 tons in 1903; and 27,343 tons lead, against 21,172 tons last year.

SOME SOURCES OF ERROR IN THE ESTIMATION OF LIME.

By Charles E. Rueger.

The purpose of this article is to point out a few sources of error in the technical estimation of lime and alumina. While the existence of these errors is realized in a vague manner by chemists in general, their extent, in certain cases, is not always fully appreciated. It may be argued that, in technical analysis, accuracy is subordinated to speed; the utilitarian purposes of such work being very naturally considered of primary importance. I question, however, whether errors of 2 or 3 per cent would be considered satisfactory, even under this plea. Yet with the prevailing system of short-cut methods, so generally in use in our smelter laboratories, inaccuracies of this magnitude are quite possible in certain cases, not alone in the determination of lime and alumina, but of other frequently occuring elements and compounds. Such inaccuracies really reflect no discredit upon the chemist, but rather upon prevailing laboratory conditions, of which they are a logical consequence.

For the estimation of lime, the rapid method usually followed, is to take the filtrate from the silica, separate the iron and alumina by a single precipitation with ammonia and ammonium chloride, and from the resulting filtrate the lime is precipitated with oxalate of ammonia. The hydroxides of iron and aluminum, if present in considerable quantities, will retain lime, which cannot be eliminated by any reasonable amount of washing with boiling water. In some cases, the lime so retained will amount to several per cent, nor will a reprecipitation with ammonia wholly eliminate it; in the latter case the combined hydroxides may still carry over 1 per cent of CaO. In support of this statement, it is quite unnecessary to cite more than a few well digested examples.

The first sample is a Butte blast furnace slag. This slag was chilled in water, and is completely decomposable in aqua regia. Being a typical metallurgical product of the Butte district, its composition may be of interest to others than chemists, and, therefore, is given in full:

SiO_2	45.64	per cent.
FeO (Fe 46.02)	20.60	"
Fe_2O_3 (Fe .84)	1.20	"
Al_2O_3	7.12	"
CaO	21.78	"
Cu	0.36	"
As	0.03	"
Zn	0.66	"
MgO	0.93	"
S	0.22	"
Na_2O and K_2O	1.08	"
H_2O	0.24	"
Total	99.86	"

It will be noticed that the silica, ferrous and ferric iron, alumina, and lime constitute about 96 per cent of its composition. In order to obtain data relative to the retention of lime by the iron and aluminum hydroxides from this slag, separations were made by a single ammonia, a double ammonia, a single basic acetate, and an ammonia and basic acetate precipitation, with the following results:

	CaO, per cent.	Error, per cent.
Single ammonia precipitation	19.65	2.13
Double ammonia precipitation	20.19	1.59
Double ammonia precipitation	20.26	1.52
Single basic acetate	20.89	0.89
Ammonia and basic acetate	21.81	....
Ammonia and basic acetate	21.76	....

With this slag, therefore, an ammonia precipitation, followed by a basic acetate precipitation, is absolutely necessary to separate all of the lime; further examination of the hydroxides showing that this separation was virtually complete.

Another blast slag, containing 19.4 per cent iron and 5.4 per cent alumina, gave:

	CaO, per cent.	Error, per cent.
Single ammonia precipitation	18.68	2.17
Double ammonia precipitation	19.32	1.53
Single basic acetate	20.01	0.84
Ammonia and basic acetate	20.87	....
Ammonia and basic acetate	20.84	....

The laboratory which furnished this latter sample reported 18 per cent lime, following its usual custom of making a single ammonia precipitation; a result which is 2.85 per cent below the actual lime contents.

The alumina is customarily determined by difference; consequently, the lime retained by the hydroxides is reported as alumina. This adds another possible source of error, as well as explanation for the divergent alumina results commented on in my recent article published in this Journal.[1]

In reporting these experiments, it is necessary to state that all of the re-agents and water used were examined, and only unweighable traces of lime found therein. Ammonia generally contains carbonate of ammonia. The foregoing results would naturally suggest its presence in the ammonia used. The mean result of several determinations gave 0.026 grams carbonate of ammonia for every 100 c.c. of concentrated ammonia water. It is, therefore, obvious that the amount of ammonic hydrate ordinarily used, say 20 c.c., would introduce into the solution a quantity of carbonate wholly inadequate to account for these errors.

As a reason for the higher results following the basic acetate precipitations, it might be argued that under certain conditions some of the rare earths, if present, would pass into the filtrate and could be precipitated as oxalates. In order to remove any possibility of this nature, each filtrate from the basic acetate separations was made ammoniacal, boiled, and any resulting precipitate filtered off before determining the lime. This treatment would, of course, remove all of the rare earths. Generally, the separation of iron and alumina, by means of a basic acetate precipitation, is not quite complete; slight quantities, more especially of the alumina, remaining in the filtrate, which must be recovered by treatment with ammonia and ammonium chloride.

With materials containing much larger quantities of iron than these slags, but with little or no alumina, my experience has been that the lime can generally be separated by a double ammonia precipitation, to an extent which, for most purposes, can be considered complete. The conclusion, therefore, is that the gelatinous aluminum hydroxide is mainly responsible for the results herein reported, and that the separation of considerable quantities of lime from aluminous material requires special analytical treatment.

[1] "A Method for the Direct Determination of Alumina." Engineering and Mining Journal, Vol. XXVII., page 357. March 3, 1904.

PETROLEUM IN GERMANY.—The production of the Wietze oil-field, near Hanover, in 1902, was 28,797 metric tons, and the estimated output for 1903 is 40,000 tons. There are fully 150 producing wells, and the storage facilities are ample. The profits are said to be enormous, owing to the German tariff on imported oil. The Deutsche Bank is largely interested in the development of the field.

RECENT LITERATURE ON ECONOMIC GEOLOGY.—XI. IRON ORES AND OCHER.

By Edwin C. Eckel.

Iron Ores in the Uinta Mountains, Utah. By J. M. Boutwell. *Bulletin* 225, United States States Geological Survey, pp. 221-228.

Description of a series of iron ore deposits occurring in Wasatch county, in northeastern Utah. The deposits are situated on the southwestern slope of the Uinta Mts., and are said to be "easily accessible from the west, by way of Provo river and Soapstone creek. The nearest railroad point is Park City, 35 miles west." The ore deposits appear to occur as replacements of a lower Carboniferous limestone along fractured and brecciated zones having a general east and west trend. The ores are hematite of two types—a red ochreous and a gray, massive, semi-specular. Analysis of a selected sample of the gray ore gave 79.34 per cent Fe_2O_3, 18.55 per cent silica, and 0.15 per cent alumina. Sulphur and titanic oxide were reported absent, and only a trace of phosphorus was found.

The Lake Superior Iron Region during 1903. By C. K. Leith. *Bulletin* 225, United States Geological Survey, pp. 215-220.

Summary of work in, and publications on, the Lake Superior district during the past year; with a somewhat more detailed account of work carried out by S. Weidman in the Baraboo district of southern Wisconsin. The ores of the Baraboo district occur in the lower portion of a magnesian limestone, which is here the uppermost member of the pre-Cambrian. They are mainly hematites of bessemer grade, varying considerably in physical characters, and accompanied by a small amount of limonite. At the Illinois mine the ore deposit is 30 to 35 ft. thick, and the ore averages 54 to 58 per cent metallic iron. Weidman considers that the ore deposits are contemporaneous with their enclosing rocks, representing the metamorphism of a limonite bed formed as a lagoon deposit, similar to the bog ores of the present day.

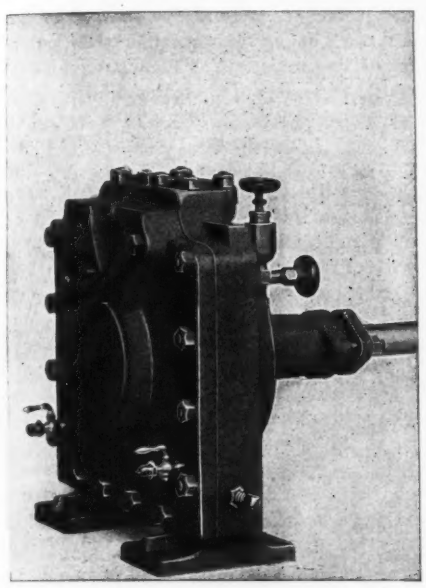
The Yellow Ocher Deposits of the Cartersville District, Bartow County, Georgia. By T. L. Watson. *Transactions* American Institute of Mining Engineers. Advance reprint, 1904; pp. 24.

A discussion of the occurrence, composition, origin, mining and preparation of the ocher. In treating of the occurrence and origin of the ocher, the writer follows closely the statements made by C. W. Hayes in 1901 (*Transactions* American Institute of Mining Engineers, Vol. XXX, pp. 403-419), adding only that "an additional source of the iron oxide, not considered by Hayes, is derived from the oxidation of disseminated pyrite throughout the quartzite. The source of iron oxide from this direction may possibly have been of only secondary importance." It is to be noted that Hayes' paper of 1903 (in *Bulletin* 213, United States Geological Survey), differs somewhat from that of 1901, so far as the statements as to occurrence are concerned.

THE DONETZ COAL BASIN, RUSSIA.—The Russian coal-fields of Donetz occupy the enormous area of 30,000 square kilometers, and contain every known species of coal. The reserves are great, sufficient, it is supposed, to last for several hundred years.

A COMPACT STEAM OR COMPRESSED AIR MOTOR.

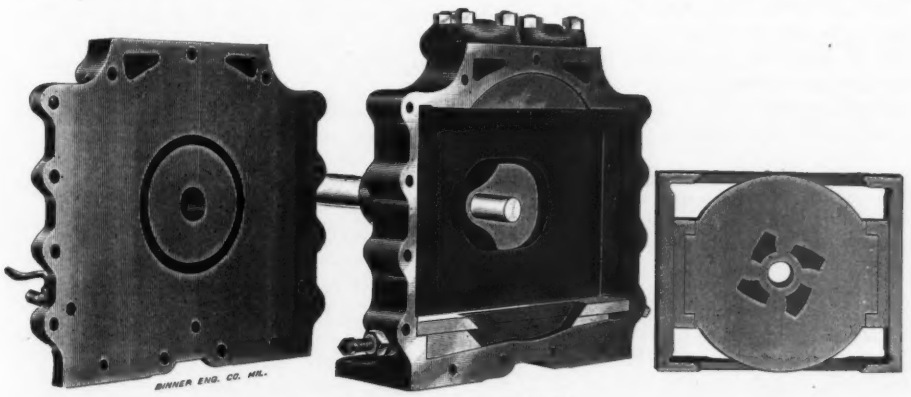
We illustrate herewith the Dake motor, which is a very compact and reliable motor for centrifugal pumps, fans, blowers and all forms of hoisting machinery. The first plate shows the engine with cover off and piston



DAKE MOTOR—COMPLETE.

removed; from the position of crank and pin it will be noticed that there are two moving parts, one sliding inside the other and both floating in a square steam-tight box, or cylinder, and guided in their movements by the crank on the end of the driven shaft.

The inner piston has removable shoes, which can be adjusted, to compensate for wear, when necessary; and the cylinder is also provided



DAKE MOTOR—DETAILS.

with adjustable wedge for the same purpose. The inner piston or cross-head has, cored through its body, four ports, leading to its four sides, which communicate with ports cut in the cover, or cylinder head, of the engine.

These motors are made in all sizes from 1 to 20 h. p., of a reversing and non-reversing type. The non-reversing motor is used for direct connection to centrifugal pumps, ventilating fans, blowers, and wherever a compact and reliable steam motor is desired. The reversing motor, owing to its compactness, is specially adapted for compressed air work. They are used for changing jib cranes from hand to power cranes, for traveling and moving trolleys, overhead traveling cranes, and all forms of hoisting machinery.

The ease with which these motors can be attached to any form of machine can be readily understood, and they work as well in a perpendicular position, or upside down, as in the regular way. These motors are in use in mines, quarries, stone-yards, boiler shops, foundries and machine shops for a wide range of purposes. They are made by the Holland Company, of Chicago and San Francisco.

A NEW METHOD FOR MAKING CALCIUM CARBIDE.

In a paper presented to the Academy of Sciences of Paris, M. Henri Moissan describes some interesting results that were obtained in recent experiments with the electric furnace. A graphite crucible, forming the positive pole, is partially filled with calcium chloride, and a graphite rod is placed within it to serve as a negative electrode. The crucible is then filled gradually with the chloride, and the mass brought to fusion, when a current of from 10 to 15 amperes and 120 volts is turned on, for the purpose of electrolyzing the chloride. A crust soon forms, which protects the molten mass beneath. Chlorine gas may be observed passing off from the crucible, leaving the calcium in a free state. The resistance of the bath is subject to rapid changes, probably owing to the formation of a sub-chloride. After electrolysis has proceded for an hour, the current is turned off and the crucible broken. The crystalline mass, when placed in water, dissolves with the evolution of a mixture of hydrogen and acetylene gases, the latter constituting from 11.5 to 14.6 per cent of the whole. This shows that calcium and a small quantity of carbide have been found, the latter a result of the combination of calcium with the carbon of the electrodes.

By fusing a mixture of the fluoride and chloride of calcium with a small quantity of powdered charcoal, in the manner described, the process can be carried out more satisfactorily and a larger yield of carbide obtained. In several experiments the proportion of acetylene to hydrogen evolved after placing the different masses in water varied from 35.9 to 59 per cent. The carbide forms at a temperature of about 650° C.

Monazite, first discovered in 1823, and receiving its name from the Greek verb, meaning to live alone, as it occurred in solitary tabular prisms in Siberia, is an anhydrous phosphate of the rare earths, cerium, lanthanum, and thorium. Extensive deposits of monazite sand occur in the gold placers of North and South Carolina.

BOOKS RECEIVED.

In sending books for notices, will pubishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the Engineering and Mining Journal.

Report on the Pan-American Railway. By Charles M. Pepper, Commissioner. Washington; Government Printing Office. Pages, 76; with map.

Colorado Mineral Resources. Compiled by Thomas Tonge. Denver, Colo.; issued by the Colorado Promotion and Publicity Committee. Pamphlet, 24 pages.

Railway Statistics, 1884-1904. Prepared by Frederic C. Mathieson & Sons. London, England; Effingham Wilson. Pages, 204. Price (in New York), 35 cents.

Geologic Atlas of the United States.. No. 103. *Nampa Folio, Idaho-Oregon.* Washington; engraved and printed by the Geological Survey. Two maps and 6 pages text.

Mathieson's Handbook for Investors. 1904. Prepared by Frederic C. Mathieson & Sons. London, England; Effingham Wilson. Pages, 312. Price (in New York), 90 cents.

Annual Report of the United States Life-Saving Service. 1903. Sumner I. Kimball, General Superintendent. Washington; Government Printing Office. Pages, 470.

Dictionary of Altitudes in the Dominion of Canada. By James White, Geographer to the Department of the Interior. Ottawa, Canada; Public Printer. Pages, 148.

A Short Review of Mining Operations in South Australia during 1903. By T. Duffield, Secretary for Mines. Adelaide, S. A.; Government Printer. Pamphlet, 12 pages.

Report on the Auriferous Deposits of Palma Mines, Geraes, Brazil. By Luiz Ferraz. Rio de Janeiro, Brazil; reprinted from the *Brazilian Mining Review.* Pamphlet, 8 pages.

State of Michigan. Twenty-first Annual Report of the Bureau of Labor and Industrial Statistics. Scott Griswold, Commissioner. Lansing, Mich.; State Printers. Pages, 360; illustrated.

The Michigan Engineer. 1904. *Proceedings of the Michigan Engineering Society.* Edited by F. Hodgman, Secretary. Climax, Mich.; published for the Society. Pages, 300; illustrated. Price, $1.

Twenty-sixth Annual Report of the Bureau of Statistics of Labor and Industries of New Jersey. 1903. Winton C. Garrison, Chief of Bureau. Trenton, N. J.; printed for the State. Pages, 632.

Mineral Resources and Mineral Industry of Oregon, 1903. Compiled by the Department of Chemistry of the University of Oregon. Eugene, Oregon; published by the University. Pages, 120; with map and illustrations.

Missouri Bureau of Geology and Mines. The Geology of Miller County. By Sydney H. Ball and A. F. Smith. With an Introduction by E. R. Buckley, Director. Jefferson City, Mo.; State Printers. Pages, 204; with maps and illustrations.

United States Geological Survey. Mineral Resources of the United States, Calendar Year 1902. Prepared under direction of David T. Day, Chief of Division of Mining and Mineral Resources. Washington, 1904: Government Printing Office. Pages, 1038.

BOOKS REVIEWED.

A Bibliography Relating to the Geology, Paleontology and Mineral Resources of California. Prepared by the State Mining Bureau, Lewis E. Aubury, State Mineralogist. Sacramento, Cal.; State Printing Office. Pages, 290.

Those interested in books or maps relating to the geology, mineral resources and paleontology of California will be glad to learn that the State Mining Bureau has issued this bibliography of those subjects. It was written by Lieut.-Col. A. W. Vodges, Artillery Corps, U. S. A. The list of publications, maps, etc., is classified carefully and in many cases an abstract of contents is given. An index by authors covers some 20 pages, and was prepared by Mr. Charles G. Yale. The book covers all works on California as far as they relate to the subjects referred to. Even scattered chapters in official reports of all kinds, proceedings of societies, magazines, technical journals, etc., are named with date, publication and name of author. The index is very complete, making it easy to find any references required. The book is a very convenient and useful one, and has evidently been prepared with much care.

The Non-Metallic Minerals. Their Occurrence and Uses. By Geo. P. Merrill. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 428; illustrated. Price, $3.

While the author of this volume does not claim that it is anything more than a compilation, he has certainly performed a great service by bringing together and editing in convenient form the information attainable about the great variety of minerals which find a place in commerce and in the ordinary uses of life. The general treatment is similar in all cases, including accounts of the occurrence of the minerals, their nature and composition, their uses and some notes on their commercial importance and value. In many cases also, where the importance warrants it, a bibliography is attached, giving very complete references to articles and books on the various subjects. The length of the articles, of course, varies with their importance. The different minerals are arranged in groups, such as oxides, carbonates, silicates, sulphates, sulphides, etc., etc., and the book is provided with an excellent table of contents and a complete index. It forms an exceedingly useful book of reference, and ought to be valuable alike to the student, the engineer and the man of business. It is illustrated by a number of half-tones, and by geological sections and diagrams, illustrating the occurrence of minerals, their form of crystalization and many other points.

Die Mineralkohlen Osterreichs. Edited by the Committee of the Allgemeinen Bergmannstages. Vienna, Austria, 1903; published by the Central Union of Austrian Mine Owners. Pages, 490; illustrated and with folio of maps.

This volume, with its accompanying folio of maps, is published as a memorial of a meeting of the chief mining men of Austria. There being in that country, as in Germany, no society exactly corresponding to our Institute of Mining Engineers, the mine operators, mine superintendents, etc., have a great social meeting once in a while, at which topics of interest are discussed. This meeting is known as the Bergmannstag, and the present volume is compiled by the committee of the association. It is simply fair to say that a better memorial of such a meeting could scarcely be devised.

The committee decided that owing to the time available the best thing to do was to get out a revision of 'Austrian Coals,' issued first by the ministry of agriculture in 1870, and in a second edition for the Paris exposition of 1878. The present monograph, however, is more than a mere revision. It gives a most excellent summary of the coal resources of the Austro-Hungarian empire, the statistics of production showing the output of every coal mining district, and includes the figures for 1902. Considering that the work was ready for the printer in September, 1903, this speaks much for the enthusiasm and energy of the editors, who included government mining officials, the work being published by permission of the ministry of agriculture.

The editors state that it was impossible to go into the details of geological occurrence, local peculiarities of coal-beds, the production of mines and the chemical contents, heating value and places of consumption of the coal mined in every district. This, however, really increases the value of the work, since it permits the presentation of the general features of the coal and lignite deposits, and a summary of developments to date in a book of handy size that can be part of any man's working library. It will doubtless meet the modest expectations of the editors as a work that will interest not only the men immediately concerned, but a wider circle of readers.

Particular commendation may be given to the many geological maps and sections in the book, and in the 12 sheets of the accompanying folio. These, while not expensively printed, show no sacrifice of accuracy to appearance. State and government reports in this country frequently contain maps that, while pretty to look at, make the user wish that some draftsman had not deliberately taken so many liberties with nature.

Geological Survey of Canada. Annual Report of the Section of Mines for 1902. Elfric Drew Ingall, Engineer in Charge of Section. Ottawa, Canada; Public Printers. Pages, 280.

The Mines Section of the Geological Survey of Canada prepares and publishes, each year, a preliminary statement of Canadian mineral production, which usually appears in March of the following year. Thus the figures for 1903, taken from this preliminary statement, were given in the Journal, March 17, 1904. In addition to this, there is published at a later date a full statement, accompanied by the necessary comments, and much additional matter of interest. The present volume is the completed report, and it presents, in addition to the statistics, full reports of imports, exports, trade conditions and notes on producing districts. In addition to these, there are special articles on different districts. Thus we find in the present volume notes on the 'Bruce Mines District'; on the 'Salt Deposits of Canada'; on 'Zinc Ore Deposits'; an important paper on the 'Coal-fields of Canada'; besides some shorter notes.

To one who knows something of the conditions, the quantity of work done by the Mines Section, with a limited appropriation, and consequently a limited force, seems remarkable in its excellence, and in the promptness with which its results are published. Some notes on its work seem appropriate here. The Mines Section, or, as it ought properly to be designated, the Division of Mineral Resources, was inaugurated in 1896. Owing to the very limited means at its disposal a great part of the energies of the small staff have been used up in the collection and compilation of the statistical data illustrative of the growth and condition of the mineral industries of the country. The branch has, therefore, been known to the public chiefly in this connection. The other functions naturally devolving upon such a branch have, however, been recognized from the first; such as the collection and filing away of general technical information regarding the economic mineral resources of the country, as well as the publication from time to time of such descriptive matter as has become available. This feature of the work has in the past been subordinated to the statistical side, for want of means.

Notwithstanding this, much more has been done in this direction than is generally understood. A glance at the annual reports will show that, from time to time, as circumstances have permitted, special articles have been incorporated, giving in condensed form, descriptions of mineral districts and deposits, and of mining and metallurgical plants, etc. Quite a number of years ago the issuance of the various sections of this report separately in pamphlet form, was suggested, but for reasons it is not necessary to set forth here the proposal was not then entertained. This is now being done, however, and the special articles which are incorporated in the issue for 1902 will be available also in this separate form. With the limited means of the Mine Section, nothing very much could be done in the way of direct investigation of mineral districts, and the articles in question can therefore only claim to be condensations of material already published. Notwithstanding this, they serve to give a clear general idea of the useful features of the subjects dealt with, and by reason of the bibliography included in the articles the study of the subject in detail is facilitated for any one desiring to go more deeply into the matter.

The work devolving upon the staff of the Mines Section is not limited to the features above set forth. Multifarious demands are made upon them, such as the preparation and keeping up to date of maps, pamphlets, descriptive catalogues, etc., for exhibitions. Naturally, too, numberless demands are sent in for information as to economic minerals and industries, and considerable time is consumed in the preparation of memoranda answering these inquiries, so as to meet the specific and particular needs of each one.

The Sampling and Estimation of Ore in a Mine. By T. A. Rickard. New York and London, 1904; The Engineering and Mining Journal. Pages, 224; illustrated. Price, $2.

Much has been written about sampling and the valuation of mines, yet the young engineer, though he will find help in any good textbook, is liable also to get suggestions that will mislead him. This is because the personal equation is a larger factor in this than in any other work a mining engineer has to do. There is an infinite variety in ore-deposits,

and the most that the geologist can do is to classify them roughly, admitting that, while certain deposits may be taken as standard types, there are numberless variations from type; hence, though the manual labor of sampling may be easily learned, the application of this knowledge calls for a certain adaptiveness of mind. Moreover, no man is too old to learn and profit by the work of others, even though he may think his methods best suited to his personal limitations. Consequently, either for the beginner or the man of skill, a treatise that presents the views of several men, even though these views differ as to particular points, is more helpful than one that unintentionally intimates that each step in any process is fixed, and cannot be varied.

These reflections naturally come from a perusal of the book here under consideration. It is not a didactic treatise, but rather a most suggestive and helpful collection of individual opinions. Published as papers and discussions in the Engineering and Mining Journal their re-publication in handy form is something that needs no apology. Mr. Rickard's paper on the 'Sampling and Estimation of Ore' takes up the matter in detail, describing in fluent and lucid style the author's convictions as to the best methods for the determination of costs, and of the average value of the ore, with directions and hints for the actual work of sampling, the precautions to be taken, the calculations to be made after sampling, the inferences to be drawn from the sampling and the estimation of the ore reserves. It epitomises the wide experience of a thoroughly trained mining engineer. This paper of Mr. Rickard's takes up 64 pages, and how well it serves its purpose of stimulating discussions is shown by the quality of the contributions which follow. Most of these are short, but as some 25 engineers of experience and reputation gave each some suggestion, or opened some new vista of inquiry, the brevity of the contributions increases the value of the book as a whole, since each contributor discussed what was personally most interesting to him. Consequently, there is little repetition; rather developments of different phases of the same topic.

Particular attention may be given to the criticisms of the phrase, now meaningless through its use by the writers of prospectuses for wildcat companies, 'ore in sight.' Mr. Argall argues for the substitution of the expressions 'ore developed,' for blocks of ore accessible on four sides; 'ore being developed' for that accessible on one. two, or three sides; and 'ore expectant' for ore not exposed, but probably existing. Mr. Geo. E. Collins, while admitting the inexactness of 'ore in sight,' protests against all cast-iron classifications which do not allow for the infinite complexity of natural conditions. Mr. C. W. Purington calls attention to the importance of a knowledge of geological conditions, and of the prevailing form of developed ore-shoots in any district in determining the probable extent of ore exposed in a shaft, drift or winze; while Mr. George J. Bancroft points out how unsystematic methods of sampling can give reliable results, in the hands of a man who has this knowledge of local conditions, and if gifted with good judgment and an educated eye can take short cuts, and get surprisingly accurate estimates of the value of undeveloped properties.

Mr. Ernest Levy gives in detail the precautions necessary in sampling the bottom of a wet level, and Messrs. T. Lane Carter and G. A. Denny discuss the sampling methods used in the Transvaal; Mr. Denny describes the continuous section plan, and Mr. Carter takes up the arrangements for the regular sampling of the workings. Mr. J. H. Curle treats of that vital question, the net profit in sight, compares the attitude of English and American engineers, and points out that to be a good mine valuer a man must have the instincts of a financier. The matter of erratic high assays, ably treated by Mr. Rickard, is also discussed by Messrs. Curle and Argall, while Mr. George A. Packard speaks of low assays.

The mathematical calculations that may be used in applying the information gained from sampling and assaying are mentioned or described by Messrs Ross Hoffman, Blamey Stevens, J. Parke Channing and Auguste Mathez, while Messrs. C. F. Lee, Walter Harvey Weed, R. A. Parker and R. C. Gemmell speak of the tools and supplies used in breaking down, collecting and preparing samples.

From the above summary one can see that the book contains the kind of information most wanted by the working mining engineer; since this is no mere compilation of selections from text-books or treatises prepared in the study, but the opinions of many men who base their conclusions on their own experiences. In fact it is this quality of personal experience that gives the book its value, and the reviewer hazards the prediction that it will form part of the library of mining engineers, old and young all over the world. The typographical work is good, and there is a serviceable index. S.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Lead Mines of Balia.—A Correction.

Sir.—In the abstract which you have published of the article on 'The Lead Mines of Balia,' written by me, in the Journal of February 18, 1904, you have given as the cost of smelting the sum of 60 fr. per ton of ore. The correct figure which I have stated for the cost of smelting is 16 fr. per ton of ore, with coke costing 60 fr. per ton.

I would ask you to kindly correct this statement at your earliest convenience.

Georges Ralli.

Balia, Turkey, March 30, 1904.

The Use of Metallic Currency.

Sir.—I note the article, 'The Use of Metallic Currency,' in your issue of March 31, but cannot agree with Mr. Bancroft.

I understand that a bill was introduced some time ago by Representative Wiley of New Jersey "to provide for clean paper money." What we want is more paper money of small denominations, and a law to keep it clean or as nearly so as possible. The bill referred to stipulates that all paper money returned to the Treasury for any purpose shall be destroyed and new notes issued in their place. It further provides that all assessments on national banks for the return and redemption of notes shall be repealed. Mr. Bancroft states that the loss caused by attrition, if more metallic money were used, would benefit the mining industry. I do not know what the loss by wear amounts to, but, judging by some old dimes and quarters seen in circulation, I should judge it to be from 5 to possibly 10 per cent on these coins. This is a real loss, a loss to the Government, and therefore directly a loss to the people at large, whereas when a paper bill is destroyed by fire, or otherwise, it is only an individual loss. The government gains the amount and there is no real loss to the nation as a whole.

Those fond of carrying large amounts of silver about would no doubt enjoy residence here in Mexico. The Mexican government issues no bills smaller than five dollars. These bills are practically useless in making small purchases among the natives as very few ever have the change. Ten Mexican *adobe* dollars, as they are called by foreigners, are about equal to four dollars United States money and have about the same purchase value. This can certainly not be considered a large amount to carry in the pockets as ready change. These ten dollars weigh nearly nine ounces, or somewhat over half a pound.

With American money the inconvenience is not so great, but why not use one and two-dollar bills, which are much more easily carried, if they are reasonably clean?

Leon L. Krieckhaus.

Ocotlan, Oaxaca, Mexico, April 13, 1904.

ABSTRACTS OF OFFICIAL REPORTS.

Allouez Mining Company.

This company owns a property in the Lake Superior copper region, on which development work is now in progress. The report for the year 1903 shows: Cash on hand, January 1, $71,335; assessment on stock, $36,520; interest, etc., $7,505; total, $115,360. Expenses for mining and development were $102,222, leaving a balance of $13,138. Since the close of the year, this balance has been increased by $21,559, received from assessment.

The directors' report says: "The further development of the conglomerate in the first part of the year was encouraging, and a continuance of this work was desired, but so many obstacles were encountered in sinking through the sand to the rock in our No. 1 Kearsarge shaft, and these so greatly increased the cost, that it seemed best to confine our efforts for the present to the work at this shaft. This plan was therefore adopted, the difficulties were finally overcome, and since securing control of the water flowing into the shaft the average monthly sinking has been so unusually good that it is now anticipated the Kearsarge lode will be reached in the coming fall.

"In view of the known value of the Kearsarge lode to the north and south of us, the construction and equipment for this shaft is permanent in character, and while this considerably increased the cash outlay in the beginning, we believe the economies resulting therefrom will prove the wisdom of this course. A second shaft should be sunk, which, as planned, will be about 1,700 ft. from No. 1, and this shaft will be started as soon as the snow is off the ground and surface conditions will permit."

Winona Copper Company.

This company is developing a mine in the Lake Superior copper district. The financial statement for the year 1903 shows: Copper sold, 1,036,944 lb., at 13.489c., $139,875; interest, $2,254; assessments collected, $105,124; total, $247,253. Expenses at mine were $175,510; smelting, freight, etc., $11,759; Boston office, $5,589; total, $192,858, leaving a balance of $54,395. Adding $39,093 brought forward from 1902, makes a total surplus of $93,488. As the work of the year was largely in development, no average costs can be calculated.

The work done included 330 ft. shaft opening and 781 ft. drifting and cross-cutting. The mine statement shows 51,435 tons rock stamped, producing 1,687,331 lb. mineral, from which there was saved 1,036,944 lb. refined copper. The copper in mineral was 61.45 per cent. The refined copper per ton stamped was 20.16 lb., or 1.008 per cent.

The report of President John Stanton says: "The operations during the past year have been conducted with the object of testing the run of productive ground which had been penetrated south of No. 2 shaft by the bottom levels (4th and 6th), and also of making preparations for exploring the lode still farther south by extending levels in that direction. In order to carry the latter work into effect, it was necessary to sink another shaft for purposes of ventilation, as well as for hoisting rock. This shaft (No. 3) was started 1,536 ft. south of No. 2 and was made by sinking from surface, and at the same time rising from 4th level. It was completed early in January of the current year and drifting south is now in progress on the 3d and 4th levels. Stoping has been prosecuted at various points in the run of copper ground encountered south of No. 2 shaft, which, although short as far as developed, has produced an amount of copper that warrants the extension of the levels in the hope of proving that productive ground continues to the southern boundary of our property, in which event it would be advisable to erect a stamp mill and provide other equipment needed for production on a large scale.

"The cost per ton of transporting rock to mill and treating only about 175 tons daily, is considerably more than it would be if we were able to treat 1,000 tons daily in a mill of our own, but it has been deemed advisable to test the yield of the lode at various points, in order to obtain a fairly accurate knowledge of the copper contents in the kind of copper-bearing ground already encountered."

Crow's Nest Pass Coal Company.

The report of this Canadian company for the year 1903, as presented at the annual meeting in Toronto, says that the balance at the credit of profit and loss account brought forward from 1902, amounted to $950,512. To this has been added the sum of $310,492, being the net profits from the operations of the year, also the sum of $913,526 representing the premium received on calls paid on new stock; the whole making an aggregate to the credit of the profit and loss account of $2,174,530. From this amount the directors have paid four dividends making 10 per cent for the year, and amounting in all to $303,717. This amount deducted from the above balance, leaves at credit carried forward to 1904, the sum of $1,870,813.

The balance of the new issue of stock referred to in the last annual statement as to be paid during the year 1903, amounted to, including the premium, $1,646,318. On December 31 last this had all been paid, with the exception of $123,775, of which $74,265 is premium.

Substantial progress was made during the year in the permanent development of the company's properties at Coal Creek, Michel and Morrisey. It was not until February, 1904, that the mines at Coal Creek, which had been damaged by the explosion of May 22, 1902, were fully restored.

During the year nearly a million dollars have been spent on plant, development and machinery, adding largely to the efficiency and capacity of the mines and of the operating and coking plants.

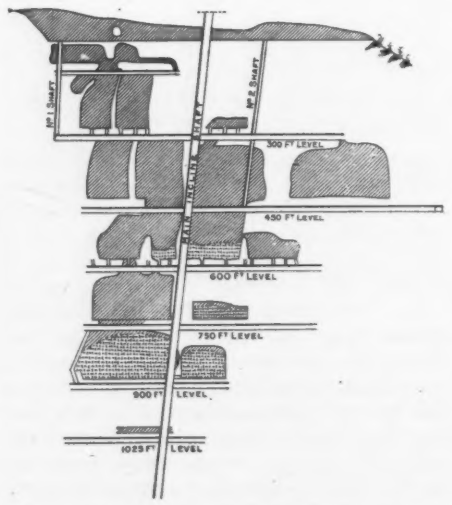
The steady increase in the production of coal is best illustrated by pointing out that the output for the year just closed exceeded that of 1902 by 49.8 per cent, while the output for December, 1903, is larger than that of January of the same year by 58.7 per cent. This satisfactory progress has been made, notwithstanding that production was materially retarded by a strike of all the company's miners, lasting from February 11 to April 1, and to a less degree by the strikes of the coke-oven men in May, and of the miners at Morrisey in September. A contract has been executed with the men, providing for wages, hours of labor and other usual matters, effective for three years, but determinable by either party at the end of the second year, and it is expected that there will be no more labor troubles during the life of this agreement.

The mountain slide at Frank, which covered up the Canadian Pacific Railway Company's main line in the Crow's Nest Pass, gave rise to a car shortage of considerable duration, as did the handling of the western harvest in the months of October and November, both of which shortages interfered to a considerable extent with the transportation, and therefore with the production of coal and coke.

Alaska United Gold Mining Company.

This company owns two mines on Douglas Island, Alaska. It operates the Ready Bullion mine, and leases the other, known as the 700-ft. claim, to the Alaska Treadwell Company.

—Ready Bullion & Golden Chariot Claims.—



The report covers the year 1903. The stock authorized is $1,000,000 in 200,000 shares of $5 each. Of these 180,200 shares have been issued, and 19,800 are in the company's treasury.

The statement of operations of the Ready Bullion mine for the year is as follows:

	Amount.	Per ton.
Free gold from mill	$203,812	$1.0046
Base bars	1,483	0.0073
Gold from sulphurets	124,163	0.6120
Total receipts	$329,458	$1.6239
Mining and development	$212,207	$1.0460
Milling ore	77,171	0.3804
Sulphuret expenses	31,098	0.1532
General expenses, Douglas Island	4,914	0.0242
General expenses, elsewhere	6,112	0.0302
Construction	7,042	0.0347
Total expenses	$338,544	$1.6687
Deficit	$9,086	$0.0448

Credited to the 700-ft. claim are $40,107 for gold recovered from sulphurets saved in 1902, and $3,600 rental from Alaska Treadwell Company, a total of $43,707. Sulphuret charges and miscellaneous items amounted to $6,805, leaving a net balance of $36,902. The income account for the year was as follows:

Surplus, 700-ft. claim	$36,902
Deficit on Ready Bullion mine	$9,086
Balance of interest account	1,615
Total charges	$10,701
Net profit for the year	$26,201

The mine statement shows 2,127 ft. of development work. There were 202,881 tons of ore taken out and sent to mill, nearly 43 per cent coming from the 750-ft. level. The ore in sight below that level, at the close of the year, was 296,210 tons. The cost of explosives was 20.03c. per ton of ore broken. There was an average of 9.69 machine drills at work during the year. The total number of feet of holes drilled in the mine during the year was 173,902, and the number of tons of ore and waste broken was 191,197, making an average of 1.1 tons broken for every foot of hole drilled. The average assay value of 1,109 samples taken from the mine is $1.84. The accompanying sketch plan shows the condition of the mine.

The mill statement shows that the stamp-mill ran 353 days 13 hours, and was idle 11 days 11 hours. The average duty was 4.78 tons per stamp per day. There were 202,881 tons ore crushed, and 4,084 tons sulphurets saved, being 2.02 per cent of the ore. The quicksilver used was 26,659 oz. in batteries and 8,094 oz. on plates; 34,753 oz. in all. Supplies included 510 shoes, 450 dies, 7 cams, 14 camshafts, 30 tappets, 3 boss-heads and 611 stems replaced; 12 vanner belts were replaced. During the year one pound of Koppel steel in the shoes crushed 2,313 tons of ore, and one pound of iron in the dies (which were cast in the Treadwell foundry) crushed 3.22 tons of ore, at a total cost of $0.0365 for the iron and steel consumed in crushing one ton of ore.

One man was killed by a fall of rock. Six were injured, two in the mill, two by falling down the shaft, one by a skip and one by explosives. Labor was plentiful, with the exception of machine drillers.

The report says: "During the year, under the terms of its lease, the Alaska Treadwell Gold Mining Company drove its 750-ft level easterly into the 700-ft. claim to a point vertically under the bottom of the 700-ft claim main shaft with which it connected by a raise. This work did not develop a payable grade of ore. When the Alaska Treadwell 900-ft. level is started, it will also be pushed easterly into the 700-ft. claim and connected with its main shaft. It is hoped that this work may develop some good ore. In the meantime, all the 100-stamp mill and surface property is being taken care of by the Treadwell Company, and any supplies or machinery that may be removed are carefully accounted for."

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Copper from Mine Waters.—Can you refer me to literature dealing with the treatment of mine waters for the recovery of copper and other metals? I would like to know the kind of metals and the quantity of each carried in solution; also the average recovery of copper made by the 'old junk' or iron precipitation method?—G. W. G.

Answer.—The character as well as quantity of metallic substances contained in mine waters depends altogether upon circumstances. Some ores are little influenced by contact with underground waters, being practically insoluble under ordinary conditions. In fact, it is only in exceptional cases that the water drained from mines carries a material quantity of metallic salts. Iron and copper are the most common metals found in solution, and they are usually present as sulphates formed by the oxidation of pyritic ores. You will find a description of the iron precipitation process for treating copper-bearing solutions in Eissler's 'Hydro-Metallurgy of Copper;' the process has been described also in past issues of this JOURNAL.

Masonry for Underground Workings.—I would like to have some information as to the advisability of substituting masonry for timbering underground for main shafts, and also for main drifts, permanent waste-filling chutes, and the like. I have seen a good deal of masonry underground in Mexico and Spain, but have no data as to costs and efficiency. We have here large quantities of excellent building stone, and good masons who can be hired on small wages.—W.

Answer.—There is no doubt that for the purposes you mention masonry can be used, and that it will be of permanent value. The whole question resolves itself into one of relative costs and economy in working. In the United States, where it is customary to work out a mine as fast as possible, and a short life is rather expected, masonry is very seldom used underground. Moreover, in most parts of the United States, although stone or brick may be abundant, wages of masons are very high, which would make the cost excessive. Recently concrete has been used in some large shafts in the anthracite coal region, which will probably be in use for a considerable time. In Europe, on the other hand, where mines are worked in much more deliberate fashion, and the object usually is to make a mine last for several generations, rather than to look entirely to immediate profit, the use of masonry and concrete in shafts, adits, main passages and the like, is quite frequent. In your case it seems likely that masonry would be economical under the conditions you mention of abundant stone and cheap labor; that is, provided the life of the mine may be expected to be long. It is one of those cases which must be worked out largely from local conditions, and it is very difficult to lay down any general rules.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

ROYALTY PAYABLE ON ORE MINED NOT DUE WHEN THERE IS NO ORE.—Where a mining lease gave the grantees the right to mine all iron-ore under certain land designated for the period of ten years, for which they agreed to pay the grantors a royalty of 15c. per ton on the ore mined, the grantees binding themselves to mine not less than 100 tons a month, such lease contained an implied covenant that the land contained minerals, and no ore having been found in paying quantities, the grantees were not bound to pay royalties under same.—Brooks v. Cook (34 *Southern Reporter,* 960); Supreme Court of Alabama.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending April 19, 1904.

757,433. REDUCING-MILL.—Herman W. Becht, Cincinnati, Ohio. In a reducing-mill, the combination of a general frame, a bowl supported thereon, means to rotate the same, rubbers resting normally against the lower part of this bowl, an arm pivotally attached between its ends to a fixed point on the frame and having the rubbers mentioned attached to its lower end and means connecting to its upper end whereby this arm is oscillated in a vertical plane within the bowl.

757,453. MACHINE FOR SEPARATING METAL SHEETS.—George Grove, Cumberland, Md. The combination of a series of magnets spaced apart with an opposite series also spaced apart, the spaces of one series being opposite the magnets of the other series, and means for feeding a pack of metal sheets between the series.

757,454. PROCESS OF SEPARATING METAL SHEETS.—George Grove, Cumberland, Md. A process herein described for separating metal sheets from packs which consists in causing the pack to pass between magnets arranged to act in opposite directions on opposite sides of the pack.

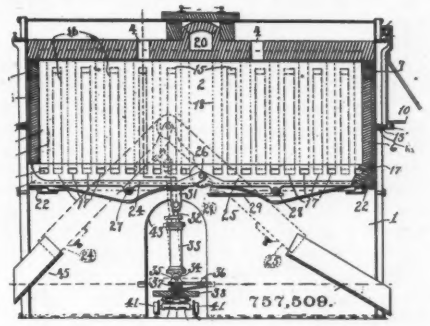
757,469. RETORT COKE-OVEN.—Andrew C. Kloman, Saxton, Pa., assignor of one-fifth to William M. Scott, Saxton, Pa. In a retort coke-oven, a horizontal flue-containing bottom pivotally mounted, and means for swinging the same into an inclined position.

757,477. APPARATUS FOR CONVEYING MATERIALS.—Hermann Marcus, Cologne, Germany. The combination, of a carrier effecting motion of the material, guided in a right line, and means substantially as described, imparting to said carrier and material carried thereby a progressively-accelerating motion in a forward direction and drawing said carrier beneath the material by a reverse movement quick at first and progressively retarded in speed in the return stroke.

757,483. PROCESS OF MANUFACTURING STONE.—Jacob C. McClenahan, Wilmington, Del. A process of making stone which consists in saturating a molding material with a chemical solution, pouring a liquid stone composition into the saturated molding material, afterward resaturating the molding material with a chemical solution, and allowing the mass to harden by absorption.

757,499. OIL-PUMPING APPARATUS. — Cyrus Robinson, Edgewood Park, Pa., assignor to the Westinghouse Machine Company. The combination with an oil-reservoir, of a pump-cylinder communicating with said reservoir by means of a valved passage, a piston operating in said cylinder, a discharge-pipe communicating with said cylinder by a valved passage and an interposed transparent tube containing a freely movable device, the movement of which indicates the flow of oil.

757,509. RETORT COKE-OVEN.—William M. Scott, Saxton, Pa. In a retort coke-oven plant, a battery of coke-ovens having pivotally-mounted bottoms, and



transportable means adapted to be operatively connected to any selected bottom for swinging the same on its pivotal mounting.

757,522. CEMENT-KILN-CLEANING MACHINE.—Chester J. Van Doren, Iola, Kans. In a kiln-cleaning machine, a carriage for reciprocating the cleaning-bar, and a frame having universal movement, the carriage being operatively mounted upon said frame.

757,531. PREPARING IRON PYRITES FOR DESULPHURIZATION.—Utley Wedge, Ardmore, Pa. A mode of preparing relatively small particles of iron pyrites for desulphurization, said mode consisting in combining said particles with sulphate of iron and forming them into blocks or briquettes, substantially as specified.

757,557. ELECTROLYTIC DEPOSITION APPARATUS.—William J. Jory and Joseph H. Jory, San Francisco, Cal. An apparatus comprising a sluice-box and electrodes swinging on horizontal axes and adapted to float on the surface of a stream passing through the box.

757,582. PROCESS OF WELDING STEEL PLATES, ETC., TO SHEETS OF ALUMINUM AND ALUMINUM-PLATED OTHER METALS.—Heinrich Wachwitz, Hersbruck, near Nuremberg, Germany, assignor, by direct and mesne assignments, to the Wachwitz Patents Syndicate, Limited, London, England. A process for welding plates or bodies of steel or other metals which are liable to slow oxidation when being heated, to sheets, of aluminum or other metals plated with aluminum, consisting in cleaning the surfaces of the aluminum or aluminum coating and of the steel plate, or other metal plate which surfaces are subsequently to be placed in juxtaposition, placing the metals to be welded upon the steel plate or other metal plate, heating them to a moderate temperature and uniting them by a suitable pressure by means of rolls or other appliances sufficiently to prevent oxidation of the junction when being further heated, then further heating the compound plate close to the melting-point of the metal plated upon the steel or other plate, and welding the same by rolling or other pressure in this state.

757,604. APPARATUS FOR CUTTING METAL BARS.—Victor E. Edwards, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass. The combination with the cutting mechanism, comprising a reciprocating ram provided with a cutting-blade, of a pivoted platform for supporting the piece severed from the bar, an intermediate pivoted lever connected with said reciprocating ram, and also connected with said bar-supporting platform whereby said platform is rocked simultaneously with the operation of cutting.

757,606. MEANS FOR OPERATING HYDROCARBON-BURNERS FOR METALLURGICAL FURNACES.—Herman W. Falk, Milwaukee, Wis., assignor to the Falk Company, Milwaukee, Wis. In means for operating burners for furnaces, the combination of a furnace provided with an opening, a rail extending from the furnace, a carriage adapted to travel on said rail, a burner carried by the carriage, means for permitting an angular adjustment of the burner, and means for causing the carriage to

travel inwardly on the rail so as to carry the burner to the opening of the furnace.

757,617. PROCESS OF PRODUCING CARBIDE.—William S. Horry, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y. A process of producing carbides, which consists in placing the terminals of a source of electric current in contact with different parts of a charge of carbide-forming materials, passing different quantities of electric current through different portions of said charge, and increasing the current density along the path of the current in the charge to a point where the heat generated by the resistance of the charge causes the materials to react to form carbide.

757,621. ELECTRIC FURNACE.—William S. Horry and Edgar F. Price, Niagara Falls, N. Y., assignors to Union Carbide Company, Niagara Falls, N. Y. An electric-resistance furnace, comprising a hearth to support a charge or molten product of conductive material, three or more electrodes in contact with said charge or product and so arranged and connected to the source of electric current as to maintain a region of maximum current density in an intermediate portion of said charge or product, and means adjacent to the region of maximum current density for withdrawing the product by gravity.

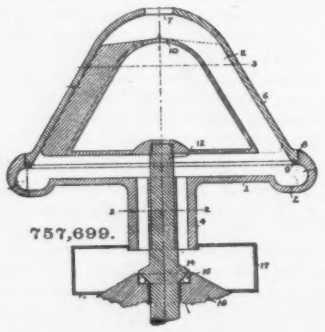
757,633. ELECTRIC HEATING.—Edgar F. Price, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y. The process of heating materials, which consists in placing the material in proximity to a stable resistance-conductor, and passing superposed electric currents through said conductor, thereby increasing the current density along the path of the current, through a portion of the conductor in proximity to said material.

757,634. ELECTRIC-RESISTANCE FURNACE.—Edgar F. Price, Niagara Falls, N. Y., assignor to Union Carbide Company, Niagara Falls, N. Y. An electric-resistance furnace, comprising a stable resistance-conductor in position to heat the charge, and means for passing different quantities of electric current through different portions of said conductor, thereby producing a varying current density through the conductor and heating it uniformly.

757,649. MANUFACTURE OF PLASTER-OF-PARIS.—William Brothers, Prestwich, England. A process of preparing plaster-of-paris from calcium sulphate in any form comprising the cooking or boiling of such calcium sulphate in the presence of water, and separating the crystals so formed and drying them before cooling.

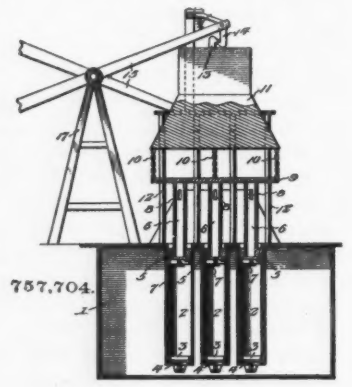
757,693. BLASTING COMPOUND.—Jacob Tollner, New York, N. Y., assignors to F. G. Dokkenwadel and H. M. Grant, New York, N. Y. A composition of matter consisting of nitrate of potash, approximately 15 per cent.; nitrate of soda, approximately 30 per cent.; sulphur, approximately 15 per cent.; spent tanbark, approximately 20 per cent., and horse-manure, approximately 20 per cent., mixed and incorporated.

757,699. CENTRIFUGAL ORE-CONCENTRATOR.—Edmund R. Week, Spokane, Wash. A centrifugal ore concentrator and amalgamator, comprising a rotatable base having water-escape openings and an



annular trough, an outer cone having its lower edge concentric with the trough, and provided with an inlet-opening in its upper end, an inner concentric cone supported above said base, and one or more radial wings extending across the annular space between said cones.

757,704. AIR-COMPRESSOR.—John C. Williams, Kansas City, Mo. In an air-compressor, the combination with a receptacle having a valved cylinder therein, a valved piston slidably mounted within the cylinder, and a tubular rod to the piston having an air-inlet; of a lever fulcrumed adjacent the cylinder, a weight above the piston, a flexible connection between the weight and piston, and means for auto-



matically engaging the lever with, and disengaging it from the weight.

757,713. EXPLOSIVE COMPOUND.—John P. Arnold, Colfax, Ill. An explosive compound, consisting of chlorate of potash, yellow prussiate of potash, saltpeter, sulphur and tannin.

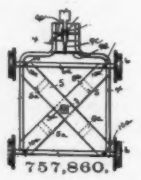
757,732. COAL-TIPPLE STRUCTURE.—Thomas W. Fitch, Jr., Sewickley, Pa. In a coal-mine structure, the combination of a cage, tracks leading thereto, a truck movable in a direction parallel to that of a car upon the tracks and carrying a dog adapted to allow a car to pass along the track toward the cage, but to abut against a car which has passed it in moving toward the cage and to impart a propelling force to the car, a fluid-pressure cylinder provided with a piston which imparts movement to the track, and means for automatically reversing the piston when it shall have made a certain predetermined traverse.

757,753. DUMP-CAR.—Arthur King, Middletown, Pa., assignor to Middletown Car Works, Middletown, Pa. In a car, the combination with a truck-frame composed of channeled side members with their flanges presented outwardly, said side members being bent to form the ends of the frame, a splice-plate to connect the bent ends, and a superposed draft member.

757,803. PROCESS OF TREATING AND MANUFACTURING STEEL.—Walter B. Burrow, Norfolk, Va. The introduction of dephosphorizing material in a pulverulent form, in the manufacture of steel, by means of the air-blast under pressure in different thickness or depths of the molten metal and by drawing in the dephosphorizing material at a certain stage of the process by means of a vacuum, and the expulsion of the gases from the vessel on the introduction of the purifying material into the converter.

757,817. PROCESS OF ELECTROLYTICALLY EXTRACTING COPPER AND ZINC FROM ORES.—Stanislaw Laszczynski, Kielce, Russia. Process for electrolytically obtaining metals, especially copper and zinc, out of their ores by means of insoluble anodes, consisting in tightly wrapping the insoluble anode in a porous and perfectly permeable envelope of fabric or other suitable material, the thickness of which is in inverse proportion to the applied density of current, for the purpose of preventing anodic oxidation of the cations.

757,860. ORE-CAR.—Charles Canclini, Stockton, Cal. In an ore-car the combination with suitable truck wheels and axles, of side pieces, braces, provided with vertical projections adapted to prevent the car-



box from sagging, said side pieces and braces connected to the axles by means of bolts, the side pieces curved to form a nose at the front end, a turning platform connected to the braces; hinges connecting said platform to a car-box provided with a door or gate.

757,858. APPARATUS FOR SCRAPING ORE FROM WINGS OF VESSELS.—Matthew Andrews, Cleveland, Ohio. The combination with a vessel having a hatchway, a frame arranged to span such hatchway and rest upon the hatch-coaming, hooks carried by said frame and adapted to engage the coaming at the end of the hatchway, winding mechanism mounted on said frame, cables leading from said winding mechanism down into the hold of the vessel, pulleys carried by the stanchions of the vessel around which said cables pass, and scrapers secured to said cables.

757,883. CEMENTING MATERIAL AND PROCESS OF MAKING SAME.—Thomas W. Cappon, Ossining, N. Y. A process of forming a cementing material which consists in hydrating to a considerable extent a mixture of calcium and magnesium oxides and adding thereto a suitable proportion of a suitable chloride, whereby an oxychloride of magnesium is formed.

757,901. UNLOADING DEVICE FOR AIR-COMPRESSORS.—William S. Fairhurst, Brooklyn, N. Y., assignor of one-half to John J. Riley, Brooklyn, N. Y. In an unloading device for a compressor, a chamber in the lower part of which is a cylinder, an upwardly opening relief valve and a seat therefor in said chamber above said cylinder, a piston in said cylinder, the piston being of larger area than the said valve, a communication between the outlet of the compressor and said chamber above said valve, an escape-outlet to the atmosphere from said chamber between said valve and piston, a communication between the receiver of the compressor and the space below its piston, a loading device applied to said valve for closing it, a spring between the piston and valve for opening the latter, and a loading device applied to said piston and acting thereon in opposition to the pressure in the receiver.

757,939. APPARATUS FOR THE DISTILLATION OF WOOD AND PRODUCTION OF CHARCOAL.—Henry A. Mackie, New Orleans, La., assignor of one-half to Elmer E. Wood, New Orleans, La. The combination of a charcoal-kiln, an inclined retort passing through said kiln, and means for collecting the products of distillation from said retort.

758,003. ADJUSTING MECHANISM FOR SHEET-MILLS.—Sumner B. Ely, Allegheny, and Harry H. Anderson and William W. Slick, Pittsburg, Pa., assignors to American Sheet Steel Company, New York, N. Y. In roll-adjusting mechanism, the combination with the adjusting-screws of an operating-lever, connections between said lever and both screws, whereby the latter may be rotated, and means operated from said lever for disengaging the rotating means from both screws.

757,969. PULVERIZING-MACHINE. — August Schoellhorn and Herman S. Albrecht, St. Louis, Mo. In a pulverizer, the combination with the rotary beater, of a grate disposed beneath the beater, and composed of semi-circular supporting-bands secured by their ends to the casing, divided intermediate of their ends, and grooved in their tops, semi-circular bars fitted within the grooves of the semi-circular supporting-band; provided with upwardly projecting teeth, grate-bars extending transversely of the supporting-bands, and fitted between the teeth of the semi-circular bars, and means for adjusting the adjacent ends of the sections of the semi-circular bands toward one another.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending April 2, 1904.

11,119 of 1903. LINING FOR ROASTERS.—N. M. Hansen, Berlin, Germany. In rotating roasters, using a layer of non-conducting material between the metal shell and the usual refractory lining.

28,800 of 1903. MAKING PAINTS.—W. J. Armbruster and J. Morton, St. Louis, Mo., U. S. A. Improvements in the inventors' process for making pigments composed of zinc and barium compound, and referring especially to the recovery of the acid used.

1,415 of 1904. SAFETY CLAMP FOR MINE CAGE.—J. Lewis, Tredegar. Improved method of automatically clamping mine cages to the guide-ropes, in case of the breakage of the hauling rope.

2,460 of 1904. CASE-HARDENING COMPOUND.—J. Cadotte, Suncook, New Hampshire, U. S. A. A case-hardening compound composed of calcined plaster of paris, prussiate of potash and lamp-black.

SPECIAL CORRESPONDENCE.

Butte. April 28.

(From Our Special Correspondent.)

Landscape gardening in connection with copper smelting is something new, but is being tried at the Washoe smelter, at Anaconda, where the grounds, both within and without the enclosure are being laid out in lawns, gardens and shrubbery. The purpose is to demonstrate that since the new flue and tall stack have been in use vegetation of all kinds adapted to this climate will thrive, the idea being to prove the complete combustion or condensation of all matter deleterious to vegetable growth.

The new gold district said to have been found last season on Owl creek, in the northern part of Lemhi county, Idaho, will receive an influx of prospectors and others as soon as the mountain trails are passible. Owl creek heads in the Bitter Root range and empties into the Salmon river, 15 miles below the old quartz camp of Shoup. There are two ways of reaching the district, one by the Bitter Root branch of the Northern Pacific Railroad from Missoula, leaving the railroad at Hamilton and crossing the Bitter Root range; the other is by way of Salmon City, from Redrock on the Oregon Short Line, going down the Salmon by flat boat to the mouth of Owl creek. Parties are already on their way from both points. Another season's prospecting will give a better idea of the gold possibilities.

Denver. April 23.

(From Our Special Correspondent.)

Last week, reference was made to the operations of the Colorado Fuel & Iron Co., at the Pueblo plant. Although the works are not all running at full capacity, every department is in operation and more than 3,000 men are employed. For some time past orders for rails for the Missouri Pacific, and other railroad companies, have been received, and work on these has started.

The Supreme Court of Colorado issued a writ of habeas corpus in behalf of Charles H. Moyer, president of the Western Federation of Miners, who has been in jail at Telluride for some time, ordering the commanding officers of the State militia to produce him in Denver before April 21. Accompanied by General Bell, Captain Wells and an escort of militia, the prisoner arrived in Denver. W. D. Haywood, the secretary-treasurer of the Western Federation of Miners, tried to reach Mr. Moyer, and converse with him on his arrival, and when Capt. Wells refused to allow this, a fight between Haywood and a number of the guards ensued, during which the former was roughly handled. He was placed under arrest by the military, shortly after, turned over to the civil authorities and taken to the county jail. In the afternoon Moyer, accompanied by the two militia commanders, was taken before the Supreme Court at the State capitol, where the question of his being admitted to bail until the extent of the Governor's authority is decided by the court was argued. One of the three judges constituting this court will be absent until April 29, and Chief Justice Gabbert announced that the court wished to have a full bench decide the important question of the Governor's right to suspend the writ of habeas corpus. Moyer's attorney then took up the question of bail for his client, and the court took this question under advisement, remanding the prisoner, in the meantime, to the custody of the military authorities, who a few hours later started back to Telluride with the prisoner.

The construction of the Moffat railroad, the Denver, Northwestern & Pacific, is progressing nicely, and within a few weeks trains are expected to be running into Rollinsville, about 40 miles northwest of Denver. This road, when completed through Colorado, will open a great, and thus far almost entirely undeveloped territory, and promises to become an important factor in trans-continental traffic.

A short time ago reference was made to the question of the pollution of the water of the Arkansas river, a very important one for the State of Colorado. On April 20 representatives from the cities along the river between Leadville and the Kansas State line, held a meeting at Cañon City, where they discussed plans of purifying the water. About three years ago, a similar meeting was held at Pueblo, but nothing was accomplished. An executive committee has now been appointed to consider the subject with the various city councils, raise funds, hire legal assistance and to call meetings whenever such action is desirable.

The mine owners in the Cripple Creek district have received a letter from the Cripple Creek District Mine Owners' and Operators' Association, requesting them not to give leases to those who are not in sympathy with them, and to bind those to whom leases are granted not to employ any men who are objectionable to the association.

BY TELEGRAPH.

In a decision on April 25 Chief Justice Gabbert, of the State Supreme Court, decided that President Moyer, of the Western Federation of Miners, must remain in charge of the military until the court has given its decision in the habeas corpus case. The chief justice said: "If the liberty of the petitioner alone were involved, we should probably resolve the doubt in his favor, admit him to bail and determine the question of jurisdiction afterward. But the head of the executive department of the State has stated in the return to the writ that in his solemn judgment peace and tranquility cannot be restored in the county of San Miguel unless the petitioner remains in the custody of the military authorities."

San Francisco. April 20.

(From Our Special Correspondent.)

In the decision of the case of John Hays Hammond et al. against F. W. Bradley et al., involving control of the Oroville Gold Dredging & Exploration Co. referred to last week, the point concerning jurisdiction of a California court over a mining company organized under the laws of Arizona is of interest. The defendants urged that the court had no jurisdiction on the ground that the controversy between the parties was one affecting the management of the internal affairs of a foreign corporation. There are many decisions which lay down the broad rule that a court has no jurisdiction in any case where the relief sought would amount to a regulation of the internal affairs of a foreign corporation, but close examination of these indicates that the refusal to entertain jurisdiction is based on two grounds: First, the impropriety, viewing the question as one of comity between sovereignties, of the courts of one State undertaking to regulate the conduct and management of corporations deriving their existence and powers from another State, and, second, the inability of the courts in dealing with foreign corporations to execute their decrees by proper process. In his decision the judge states that there may be cases in which neither of these considerations is applicable. Where the stockholders, the property, the office and the officers of a corporation are so situated that it would be impossible for anyone claiming a right against the corporation or its officers to enforce that right in the courts of the State which created the corporation, there would seem to be little reason for saying that the enforcement of such right should be left to the courts of that State. And if the persons on whom the decree is to operate are all within another State, and a court of such other State can secure service of process upon them and upon the corporation, so that there is no obstacle to the enforcement of a decree, the second ground previously stated should not restrain such court from exercising its jurisdiction for the vindication of any right shown to exist. The Oroville Gold Dredging & Exploration Co. was incorporated under the laws of Arizona, but its entire property is in the State of California and its five directors are residents of San Francisco, where its meetings of directors and stockholders take place. It has no office, property, business, officer or agent in Arizona, other than an agent designated to receive service of process. Finally, the alleged wrong complained of—the issue of 40,000 shares of stock—was committed in San Francisco, and the act to be enjoined—the voting of said stock—was threatened to be done in the same city. All the defendants, the corporation included, appeared and answered. Under these circumstances the judge decided that it would be a mockery for the court to say to the plaintiffs that it would not take jurisdiction of the complaint, but that they must seek their redress, if entitled to any, in the courts of Arizona, where jurisdiction could not be obtained (except of the corporation), and that the California court could and should take jurisdiction.

The Free Gold Mining Co., owning the famous Golden Cross mines, at Hedges, San Diego county, seems to find trouble in keeping out of litigation. For some years the mine has been in the hands of a receiver. By final judgment, rendered May 21, 1903, the court expressly reserved jurisdiction in the administration of the present receiver, Chas. W. Pauley. All the debts of the former administration were paid and a surplus was left in the hands of receiver Pauley, and on March 18 he was directed to hand over the property to the Free Gold Mining Co. on May 1. On April 9 Judge Torrance, of the Superior Court of San Diego, made an order allowing Jefferson Chandler $15,000 attorney's fees, Samuel Shortridge $14,500 attorney's fees and J. Wade McDonald $2,500 fees, all claimed for legal services in connection with the suit of the company against Spiers et al. in the receivership procedings. T. S. Fuller and others, representing the Golden Cross Mining Co., and J. M. Elliott, of the First National Bank, filed a petition in the State Supreme Court to set aside this order, and Judge Torrance has been ordered to come before the State Supreme Court in San Francisco on May 2 and show why a writ of review should not issue. The lawyers have made a very good thing out of this long drawn-out litigation, and apparently there is more in sight. Judge Torrance ordered the Pauley receivership continued beyond May 1 or until the fees allowed are paid off.

The judge of the United States Circuit Court has denied the application for a temporary injunction and the appointment of a receiver in the case of J. H. Hamilton against J. C. Kemp Van Ee on the grounds that the equities of the bill were denied by the defendant. This action was originally brought for an accounting in the matter of the Royal Consolidated mines at Hodson. Hamilton affirmed that he was a partner of Van Ee's at the time he negotiated the sale.

The labor troubles at the Midas mine, Harrison gulch, Shasta county, are not yet over. The company proposes to resume on the "open shop" plan, but the union insists that the company cannot get men enough until some agreement is made with the Western Federation of Miners. About 100 men were formerly employed at the mine, which is the largest single gold producer in the county.

Two tenderfoot prospectors have found a rich body of free gold ore on the hillsides near Ferry gulch, Trinity county, which is supposed to be the source of the rich placers so long worked in that vicinity. Miners have hunted for the same sort of thing in hundreds of other places above rich placer fields without finding any original source. In fact, around the richest placers in this State nobody has ever been able to trace the source whence the gold came.

Victoria. April 19.

(From a Special Contributor.)

In Vancouver last week, two judges of the Supreme Court handed down a decision to the effect that it was *ultra vires* of the Provincial Government to pass legislation prohibiting the working of Chinese underground in coal mines. One judge dissented from this view. Pending this decision the appeal taken by the Wellington Colliery Co. against the judgment delivered by another court was delayed. The Dominion Government, meanwhile, has disallowed the British Columbia coal mines regulation act.

The Tyee Copper Co. on Vancouver Island continues to maintain a very regular monthly output. The returns for March show that 4,700 tons were smelted, yielding $55,565, after deducting freight and refining charges.

A contract has been let for the construction of a large wharf at Britannia beach, Howe sound, on which will be built a large ore bin. Beside the wharf, a gridiron will be built to receive scows which may thus load or unload

with less regard to the stage of the tide. A concentrator will be also erected at the beach, the ore being brought from the mine by an aerial tramway 3.5 miles long.

It is stated that the new dredge owned by the Iowa Lillooet Dredging Co., recently launched on the Fraser river near Lillooet is already yielding very satisfactory profits, an average of 40 oz. of gold per shift having been maintained during the past fortnight.

At Camborne, both the Eva and Oyster-Criterion mills are in steady operation. Last month's clean-up from the former yielding approximately $6,000 and the latter $4,700.

Justice Martin, of the Supreme Court of British Columbia, has delivered judgment in the famous case of Tanghe vs. the locators of the Lucky Jack claim at Poplar creek. Some two months after the Lucky Jack claim was located, Tanghe staked a placer claim covering the same ground. The gold commissioner of the district at first refused record, but afterwards granted it, instructing Tanghe, however, to move his stakes so as not to interfere with the working of the Lucky Jack as a quartz property. The court has now decided that the gold commissioner exceeded his authority, and has ruled that the Shamrock placer claim is a legal location. In rendering this decision the judge before whom the case was tried comments on the indefiniteness of the wording of the affidavit prescribed by the placer mining act, by which a locator is simply required to swear that from indications he has reason to believe that there is on the claim applied for a deposit of placer gold. It is probable that as a result of this judgment the placer mining law will be amended, for as it now stands any man may stake a placer claim over a quartz location and blackmail the latter with impunity.

An injunction has been filed by a minority shareholder in the Morrison Mines, Boundary district, to restrain the sale of that property to the Boston & Montreal Consolidated, on the basis of $24,196, the allegation being that the properties are worth $150,000.

San Luis Potosi. April 20.

(From Our Special Correspondent.)

Rumor has it that the Guggenheim interests have obtained control of, or options on, such of the principal mines that produce fluxing ores, to shut out the probability of an independent smelter in Chihuahua at least for some time. This has given impetus to the movement for a smelter in Parral, and it is understood that Mr. Enrique C. Creel will have a report before the end of May which will definitely decide whether a smelter will be built or not. The movement has had the effect of making the smelters lower their charges on Parral ores. This, besides the starting up of several mills in the camp, has enabled a number of the low-grade properties to open again. The Parral Mining Co. has started its reduction plant, and Pedro Alvarado, of the Palmillo mines, is planning a sampling works near the tracks of the Parral & Durango Railroad. The Gorman Manufacturing Co., of New York, has started work on the Cerro Colorado, under the direction of H. A. Ladd. In the Santa Eulalia camp, near Chihuahua, the Santa Eulalia Exploration Co. has ordered an entirely new plant of machinery, and another company will soon start prospecting on the Josefina Co.'s ground.

A smelter is also spoken of by Mr. Mat Dahlgreen and his associates to treat the old dumps of the Pedriceña (of which it is estimated there are some 200,000 tons) and do custom work.

A new company, organized by Andres Garza Gallan and associates, of Parral, is exploring the coal fields near Sabinas, Coahuila, about 8 miles from the Mexican Central railroad, where it has something like 6,000 hectares of land and claims to have an 8-ft. seam of coal.

The Government has given the Mexican National Dynamite & Explosives Co. until August 1 to complete its plant at La Tinaja, near Torreon, Durango.

The contract for the road of the San Carlos Copper Co., from Linares, on the Monterey branch of the Mexican Central Railroad to the mines of the company, at San José, has been let to Messrs. Melville & Kelly, of Saltillo, Coahuila, and work will be pushed under the direction of E. R. Self, manager of the San Carlos Company

London. April 16.

(From Our Special Correspondent.)

A few weeks ago I was able to report that the Cambria and Tincroft mine, in Cornwall, had discovered a new vein, which promised to place the company on its legs once more. The report of the Dolcoath, which is just published, does not contain any such interesting news, but shows instead that the average contents of the ore continue to diminish, and that there has been no new discovery lately. During the last six months of 1903 the ore treated was 51,000 tons, which yielded 876 tons of black tin, which at an average price of £73 per ton sold for £64,206. The working costs of mining and dressing came to £49,528, and after the royalties of £3,280 were paid the net profit was £12,008. During the same period £5,578 was spent on development work, and £900 on plant, while £3,700 has been written off for depreciation of plant and buildings, and £10,000 from the development amount. No dividends have been paid for two years, as the mining profits have been required for the provision of working capital. The £50,000 new capital, provided on the reconstruction of the company in 1895, has been spent, and the question of further funds for development will have to be seriously considered before long. That the future of the company gives cause for anxiety may be judged from the fact that the "lord," Mr. Basset, to whom the large royalties are paid, has consented to take an active interest in the business, which yields him such a handsome income, and has had the mine independently examined by Mr. R. J. Frecheville. He has also consented to a temporary reduction of his dues.

The Tharsis Sulphur & Copper Co. did much better during 1903 than was expected. It will be remembered that during 1902 the indications were that the average copper contents of the ore opened up was seriously declining, and that within a short time the copper would not be so important as the sulphur. However, during 1903, the amount of metal produced was 6,319 tons, only a few hundred tons less than in 1902. The actual net profits from the sale of copper and pyrites were £218,860, which permitted of a dividend of 17.5% For some years past the company has been on the lookout for a new property, and recently acquired one in Norway. On further development this property has turned out very badly, and it was found that there was not a sufficient amount of payable ore to warrant the erection of a plant. The property has, therefore, been sold to a local syndicate. The company is still looking for new properties, and is open to the consideration of any reasonable propositions.

A week or two ago I mentioned that Bewick, Moreing & Co. had taken over the management of the Golden Horseshoe Estates Co., one of the big West Australian properties, hitherto associated with the names of Kaufman & Reitlinger. The report for 1903 shows the mine to be in an excellent condition, and in this case there will be no drastic reforms necessary when the firm takes over the management. The total revenue for the year was £688,668, and the net profit was £350,000, after providing for mine development, depreciation, redemption of debentures, etc. Of this profit, £270,000 is being distributed as dividend, and the balance carried forward to provide for further redemption of debentures and depreciation of plant. This company has for some time adopted the principle that the cost of mine development should not be treated as an asset, and that depreciation should be amply provided for. During the year 137,480 tons of ore were milled, yielding bullion valued at £168,000, while 28,120 tons of residues were treated by the cyanide process, yielding bullion worth £38,967, and 104,429 tons of slime have been treated in the filter presses, yielding gold worth £132,473. In addition, 20,666 tons of sulphide ore and concentrates were sold to smelters, realizing £349,000. The mine continues to open up well, and the ore ready for stoping amounts to over 800,000 tons. In the near future it is probable that the expenditure in all departments will be extensively reduced, as at present the costs are at a higher figure than is customary at Bewick, Moreing & Co.'s mines. It is also probable that less sulphides will be shipped to smelters, and the whole output treated on the spot.

Johannesburg. March 28.

(From Our Special Correspondent.)

This has been a week of apprehension. When the dreaded plague broke out at the coast ports every precautionary measure was taken to prevent its outbreak on the Rand. For months not a case has been reported from the coast cities. Ten days ago it broke out in the coolies settlement here, thirty-three Indians having died in two days before the disease was recognized as plague. The usual Johannesburg luck is apparent, even in this misfortune, for the disease has come among us in its deadly form, the pneumonic and not the bubonic. Dr. Marais, a European physician, with a large practice among the Indian coolies, reported what he thought was an excessive death-rate from ordinary pneumonia. A post-mortem examination by the government bacteriologist showed the disease to be plague. The next day Dr. Marais died of the disease. Three days after his death Mrs. Marais died; then a young friend; next Miss Marais; to-day only one member of the household is alive.

Immediately the most energetic measures were taken to prevent the spread of the disease. A company of soldiers surrounds the Indian settlement and no person is allowed to enter the enclosure without a passport. This settlement has been an eye-sore for a long time, and repeated demands for its removal have been made. The Indian coolies are British subjects, and in dealing with them care had to be taken not to cause complaint from some of the sentimentalists at home. This outbreak of plague, due entirely to the filthy habits of the coolies, has swept people off their feet, and there is now little talk about "Indian rights." A site has been selected on the bare veldt, 6 or 8 miles from Johannesburg, where the Indians are to live in the future. The Government will run workmen's trains morning and evening for the benefit of the laborers.

As soon as all the dwellers on the present site are moved out the buildings will be burned to the ground. Great care will be taken that infected rats do not escape by placing a burning ring around the entire area. For the past ten days such a war has been waged against rats that it is a wonder there are any left at all. The Government, for the past two years or so, has offered 3d. (or 6c.) for every rat killed; in one mine compound, between 5,000 and 6,000 rat tails have been handed in during the past 18 months. Instead of catching 25 and 30 a day as formerly, no more than 15 rats a week are now ensnared in this compound. Since the outbreak of the plague the run on traps has been enormous; it is fairly certain that infection will not be carried abroad by rats.

Still there has been nothing like a panic, for people have every confidence in the precautionary measures being taken. The Government placed a cordon around the Marais house, and so far no more cases are reported. Disinfectants, especially formalin, are freely used everywhere. In the poorer quarters of the city the authorities furnish disinfectant gratis. A plague camp has been established some miles north of Johannesburg, to which all cases are speedily removed. Every suspected case is carefully investigated by the bacteriological department, and but 53 cases have been reported to date. There appears to be little hope of recovery for victims, as the disease is of an extremely virulent type.

Strange to say, the mining share market has not fallen to pieces. The public does not seem to think that the plague will spread among the whites and natives. So far almost all the deaths have been among the Indian coolies; on most mines a certain number of coolies are employed, but every precaution is taken that the plague does not spread to the Kaffirs. The Kaffir mine-compounds are kept scrupulously clean and the natives are cleanly, as a whole.

The anti-Chinese have found in the plague another reason why the celestials should be kept out. They insist on the danger to the community from the presence of Chinese on the Rand. The pro-Chinese are undaunted and still cry out for more labor. Altogether the situation is very unfortunate, but there is no cause for undue alarm. The Kaffirs show no signs of fear as yet. It is believed that this cloud will pass away and be forgotten in a few months.

Lane Carter.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the Engineering and Mining Journal. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the Journal, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the Engineering and Mining Journal informed of their movements and appointments.

Mr. Horace K. Devereux is now in Alaska.

Mr. Ben S. Revett has returned to Denver.

Mr. Henry Devereux and Mr. D. R. C. Brown are in Mexico.

Mr. Edward G. Stoiber, of Colorado, is at present in Paris, France.

Mr. W. J. Cartan has left New York on his return to Oaxaca, Mexico.

Mr. O. P. Posey and Mr. Clarence McCornick sailed by the *Kaiser Wilhelm* on April 27.

Mr. C. H. Coburn has come to New York from Costa Rica to purchase mining machinery.

Mr. J. H. Kemp has resigned as manager of the Magnolia mill at Magnolia, Colorado.

Mr. R. F. Pearce returned from London on the *Majestic*, arriving in New York on April 20.

Mr. Geo. S. Raymer has been appointed assistant professor of mining at Harvard University.

Mr. Geo. H. Robinson left New York for London by the *Kaiser Wilhelm der Grosse* on April 26.

Mr. Cecil C. Morgan, formerly at Leadville and Broken Hill, has returned from Florida to New York.

Mr. J. A. Ede, of La Salle, Ill., has returned from examining mines in the Santa Eulalia district, Mexico.

Mr. Daniel Carroll Sutton, of the San Pedro mines, in Chihuahua, Mexico, is visiting New York on business.

Mr. W. H. Virgoe is superintendent of the cyanide plant of the Progreso mine, at Triunfo, Lower California.

Mr. Martin Schwerin returned by the *Byron* from Rio de Janeiro, Brazil, arriving in New York on April 20.

Mr. C. W. Geddes, of Denver, Colo., is in Mexico in the interests of the Guggenheim Exploration Company.

Mr. J. J. Trenam, manager of the Stockton Gold Mining & Milling Co., of Utah, is at Los Angeles, California.

Mr. G. C. Hewett, of Colorado Springs, has been examining the Richmond mine, in Boulder county, Colorado.

Mr. Britton Davis, of El Paso, Texas, who is connected with the Candelaria Mining Co., in Mexico, is in New York.

Mr. Walter H. Weed, of the United States Geological Survey, returned to Washington from Panama on April 21.

Mr. Arthur West, assistant chief engineer of the Allis-Chalmers Co., has resigned and will take the Mediterranean trip.

Mr. Anthony J. McMillan arrived in New York by the *Etruria* on April 24 on his way to Rossland, British Columbia.

Mr. Harold Rickard is now associated in engineering practice with Mr. Edward Doerr, with headquarters at Mexico City.

Mr. Rudolph J. Decker, electrical engineer of Salt Lake City, is at present in the City of Mexico on professional business.

Mr. John W. Daw, general manager of the Ashanti Gold-fields Corporation, has returned to Obuasi, in Ashanti, West Africa.

Mr. H. Vincent Wallace, after two months' absence in England and continental Europe, has returned to Altar, in Sonora, Mexico.

Mr. Geo. A. Packard will be at Atlanta and Boise, in Idaho, until May 1; then he will examine mines near Baker City, Oregon.

Mr. John A. Waylor, of the Hodge Iron Co., who recently returned to Denver from a trip to the Black Hills, has gone to Mexico.

Mr. A. H. Bromly is in charge of the mines and smelter of the Queensland & Australia Tin Mining Co., at Santa Barbara, in Guanajuato, Mexico.

Mr. C. T. Carnahan, of Denver, Colo., has been visiting his brother, Mr. J. S. Carnahan, manager of the Mexican Lead Co., at Monterey, Mexico.

Capt. Benjamin Tibbey, of Butte, recently accompanied Mr. S. L. Butler, of the Summit Placer, of Utah, to Mexico, to examine a gold property.

Mr. John B. Allan, general manager of sales of the Allis-Chalmers Co., has resigned his position and will take a vacation for a couple of months.

Mr. Malcolm Roberts has resigned from the Compañia Guadelupe de Bolivia to undertake the management of mines on Tasna mountain, in Tupiza, Bolivia.

Mr. Waldemar Lindgren, of the United States Geological Survey, has finished his examination of the Cripple Creek district and is returning to Washington.

Mr. Franklin Guiterman, general manager of the American Smelting & Refining Co.'s smelters in Colorado, has returned to Denver after visiting the different plants.

Mr. Edward Doerr has retired from the management of the Mexican office of the Guggenheim Exploration Co., and has opened an office as consulting engineer in Mexico City.

Mr. G. Hutton Patterson, of Colorado, has been elected director and manager of the American Consolidated Copper Co., near Lordsburg, N. M., succeeding Mr. A. R. Gibson, resigned.

Mr. W. J. Schulze, formerly captain of the Stephens mine, near Biwabik, Minn., has become general manager of the Tesora Mining Co., which owns the Forest mine near Hibbing.

Mr. E. H. Nutter, of Redding, Cal., has been appointed assistant superintendent of the Standard Consolidated mines at Bodie, Cal. Mr. Theodore Hoover has been appointed superintendent.

Mr. W. A. Price, assistant manager of the Salt Lake plants of the American Smelting & Refining Co., has been made financial agent of that corporation, with headquarters at the City of Mexico.

Mr. L. Hanchett, of Idaho Springs, Colo., has been appointed financial agent of the mining properties and reduction works owned by Samuel Newhouse, with headquarters at Salt Lake City.

Mr. Theodore F. Galtz, until recently assistant superintendent of the Massillon Coal Mining Co., has accepted the position of general superintendent at the Harwick mine at Cheswick, Pa., succeeding Mr. W. H. Scheetz, resigned.

Mr. Albert Patton has resigned his position at the Ohio works of the Carnegie Steel Co., Youngstown, O., to become superintendent of the converting department of the Bessemer steel plant of the Lackawanna Steel Co., Buffalo, New York.

Mr. Ervin Dryer has resigned as salesman for the Westinghouse Electric & Manufacturing Co. and accepted an appointment with the Allis-Chalmers Co., with headquarters at Chicago. He will give his attention to engine work and the sale of Bullock electrical apparatus.

OBITUARY.

John L. Weeks, treasurer and manager of the American Steam Gauge & Valve Manufacturing Co., died recently at his home, in Boston. He had been connected with the company for over 13 years.

John Reilly died at his home, in Philadelphia, on April 19. He was born at Abnerville, Indiana county, Pa., in 1836, and entered the engineering corps of the Pennsylvania Railroad Co. in 1854. He was rapidly advanced in the service of the company, and on April 1, 1865, he was appointed superintendent of transportation. In 1875 he removed to Philadelphia, and resigning his position with the Pennsylvania Railroad Co., engaged in many manufacturing enterprises. He was one of the projectors of the Bellefonte Furnace Co., which built a blast furnace at Bellefonte, Pa., in 1887, and was its first president.

SOCIETIES AND TECHNICAL SCHOOLS.

McGill University.—The students of the mining department of McGill University will leave Montreal about May 1, immediately after the lecture season closes, for a trip through the Crow's Nest country, and thence to Rossland, Phoenix, and other points in British Columbia. Prof. J. Bonsall Porter, head of the department of mining engineering, will accompany the students. The trip will last about six weeks, and will give an excellent opportunity to study a considerable variety of mining practice.

Idaho State Mining Association.—At the meeting on April 19 at Boise, Wayne Darling, State engineer, presided. The work of the past three months was discussed and several matters of interest to the members of the association were considered. In the evening the resident members of the association tendered the visitors a dinner at the Overland cafe. Major M. W. Wood, secretary of the organization, presided. Among the visitors to the meeting were W. C. Ralston, of San Francisco, Cal.; C. C. Stinson and Henry W. Dorman, of Pearl; W. A. Scott, representing The Engineering and Mining Journal; E. P. Cowen, of Mountainhome, and W. G. Page, of Hailey.

Society of Chemical Industry, New York Section.—At the monthly meeting, at the Chemists' Club, the following papers were submitted and discussed: 'On the Use of Rare Earth Oxides as Contact Material for the Formation of Sulphur Trioxide,' by Chas. Baskerville and R. O. E. Davis; 'Apparatus for the Determination of the Specific Gravity of Cement,' by Daniel D. Jackson; 'Resins of Gutta Percha and Allied Gums as a Means of Identification,' by Wilton G. Berry; 'Informal Talk on Plaster of Paris and Wall Plaster,' by De Laguel Haigh, and 'Analysis of Acetate of Lime,' by Wm. M. Grosvenor, Jr. At the usual informal dinner preceding the meeting there was a fairly large attendance.

INDUSTRIAL.

The Wetherill Separating Co., of New York, has removed to 52 Broadway.

The Grasselli Chemical Co., of Cleveland, O., has lighted the fires in its new zinc plant at Clarksburg, W. Va. This plant will treat high grade Missouri ores.

The Compania Minera de Nacia, working mines at Nacia, State of Chihuahua, Mex., it is stated, will shortly purchase ore bins, chutes and hoisting machinery. James Garrett is superintendent.

The Pencoyd plant of the American Bridge Co., at Pencoyd, Pa., has resumed operations employing about 1,000 men. The mills in operation at present are the blooming mill, the 28-in. and 20-in. mill, besides four steel furnaces. In a few weeks all will be in readiness to start three more furnaces and give employment to 1,000 more hands.

The B. C. Assay & Chemical Supply Co., of Vancouver, B. C., recently supplied about seven tons of quicksilver, valued at between $8,000 and $9,000, to the Silver Cup mines, of Trout Lake, and another large order was secured for 2½ carloads of chemicals for the new concen-

trating works now being erected at Trail for the Rossland Power Company.

The John A. Mead Manufacturing Co., of Chicago, recently equipped a coal-handling plant for the Quincy Mining Co., Hancock, Mich., consisting of three steel hoisting towers and steel shed, with 16 automatic railways and pick up; also a large plant for the Canadian Pacific Railroad Co. at Fort William, Ontario, consisting of four steel hoisting towers and two movable bridges, 275 ft. long, with cable road.

A 300-kw. generator and three transformers, aggregating 300 kw., will be built by the General Electric Co., of New York, for the Sumito copper mines, in Japan. A 500-kw. generator, together with 600 kws. of transformers, and a 165-kw. motor generator of same build have been ordered by the Kosaka Copper Mining Co. The generator will be driven by a water turbine of 850 h. p., built by James Leffel & Co., of Springfield, Ohio.

The Crocker-Wheeler Co., manufacturer of electric generators and motors, will on May 10 open a branch office in the Hibernia Bank building in New Orleans, in charge of W. P. Field, of the St. Louis office of the company. Although there are 15 Crocker-Wheeler branches from Boston to San Francisco, including St. Louis and Atlanta, the establishment of this new office is necessary to accommodate the steadily increasing market for electric machinery in the South and Southwest.

The Rand Drill Co., of New York, has just installed two compressed air plants for the United States Government, one at Fort Stevens, Ore., and one at Tuscaloosa, Ala. At Fort Stevens the equipment consists of a Rand 'Imperial' type 10 compressor having duplex steam cylinders 7 in. in diameter and compound air cylinders 10 in. and 6.5 in. diameter, with 8-in. stroke; several 'Imperial' pneumatic riveting hammers and calking hammers and piston air drills. The Tuscaloosa equipment consists of a Rand, 8 by 12, class C, straight-line, steam-driven compressor, a number of 'Imperial' pneumatic long-stroke riveting hammersd and 'Imperial' piston air drills.

The J. George Leyner Engineering Works Co., Denver, Colo., has placed contracts for its new plant, comprising a two-story office building, 40 ft. by 40 ft.; pattern shop, 40 ft. by 101 ft.; power house, 43 ft. by 64 ft., brick and steel construction; machine shop, 101 ft. by 206 ft., brick and steel frame-work construction; forge shop, 61 by 164 ft. brick and steel construction; crane and trolley service throughout, and pattern storage, 40 ft. by 76 ft. The machine shop has a 20-ton electric crane running full length of building; side aisles have 5-ton hand-power cranes, and a gallery is used for lighter machinery. All machines are to be electrically driven and industrial railways will con nect all departments. The plant will occupy about 25 acres.

W. F. Warden, president and general manager of the Burt Manufacturing Co., of Akron, O., makers of the Cross oil filter and the Burt exhaust head, sailed for Europe recently in the interest of his company, which has a large foreign trade, and will confine this trip to visiting agents in England, France, Germany, Belgium, Norway, Sweden, Denmark, Russia, and possibly in Switzerland, Greece and Spain. In Mr. Warden's absence Mr. J. Asa Palmer, seceretary of the company, will have full direction of its affairs. Among the many large foreign orders received in the past few days by the Burt Manufacturing Co., is one from its agent at Durban, South Africa, for 30 gross of oil filters, and one from its agent at St. Petersburg, Russia, for oil filters for the Russian Government. The company recently made for the Jones & Laughlin Steel Co., Pittsburg, an exhaust head 10 ft. high and 9 ft. 4 in. in diameter, which weighs 2,700 lb.

TRADE CATALOGUES.

The Auburn Ball Bearing Co., of Auburn, N. Y., is sending out a vest-pocket size 16-page price list of the Auburn ball bearings, showing their many valuable uses for line shafting, motor vehicles and other machinery.

The Marvin Electric Drill Co., of Binghamton, N. Y., in its catalogue, No. 4, has a number of valuable descriptions of electric rock drills and generators for operating them. These drills are for use in quarries, mines and tunnels.

Sanders & Rising, toolmakers and machinists of Los Angeles, Cal., are calling attention to their Hook gauge, which is used for the measurement of water over weirs. The gauge is no longer than a pencil, and can be readily carried in a vest pocket. By means of extensions 3 ft. of water can be measured.

A. Leschen & Sons' Rope Co., of St. Louis, Mo., has published a very creditable treatise on aerial wire-rope tramways and their application. The details of operation are gone into quite fully, and with the excellent illustrations which are added, a very interesting and valuable production has been the result. This treatise, together with the company's catalogues, can be had on request.

Belt conveyors and elevating machinery for handling all classes of material have received thorough attention in catalogue No. 21, recently issued by the Webster Manufacturing Co., of Chicago and New York. Many styles of this class of machinery are dealt with, the company making up for its brief descriptions by numerous excellent illustrations. Much space is devoted to the different accessories, such as grease cups, hangers, bearings, belting, rollers, etc.

GENERAL MINING NEWS.

ARIZONA.

MOHAVE COUNTY.

(From Our Special Correspondent.)

Gold Road.—This mine, at Acme, produced $30,000 in gold from seven days' run of the cyanide plant. Four machines are driving drifts and opening up ore.

Great West.—Preparations for crushing and cyaniding the ores of this mine, in Minnesota district, are about completed and on May 1 25 men will be added. Five large cyanide tanks have just been completed. There are two crushers with a capacity of 100 tons per 24 hours.

Midnight.—This mine, at Leland, controlled by the Mohave Gold Mining Co., is opening up rich ore on the 100-ft. level. Drifts have been run 70 ft. on the ore. About 50% of the values is free and most of the balance can be recovered by concentration.

Minnesota.—The new Elspass mill at this mine at Chloride is reported saving 90% of silver values in the old dump. Six men were added to the force.

Monmouth.—This mine, on Burro creek, is working successfully under the management of J. P. Wallace. Gold bars will shortly be turned out from the crushers and cyaniding plant. The ledge matter in the deep underground workings averages 12 ft. in width, the average value of which is $22.25 per ton in gold.

Mossbuck.—This mine, in the Silver creek district, has a body of gold and silver ore at 60 ft., averaging about $50.

Queen Bee.—Work has been stopped indefinitely in the mine at Mineral Park owing to the poor results.

Ramrod.—This gold mine, in Weaver district, under lease to Blakely & Kenney, is being worked by six men. The 10-stamp mill will go into commission about May 1 and more men added.

Samoa.—This mine, at Chloride, is said to have cut a rich body of silver ore on the 300-ft. level.

Virginia.—Blakely & Kenney, leasing this gold mine and 10-stamp mill, in the Weaver district, are working steadily. The output exceeds the capacity for handling.

CALIFORNIA.

AMADOR COUNTY.

Amador Climax.—At this mine, near Irishtown, they are drifting north on the 100-ft. level and keeping the mill busy.

Glenn.—This mine, at Volcano, has increased the force. The ledge is quite large and now all in pay.

Kennedy Mining Co.—This company, at Jackson, has this month declared its first dividend for some years. A deep shaft of three compartments has been sunk and equipped with hoist and new and enlarged mill. Grading has begun for 40 more stamps at the new mill-site at the East shaft, where all the hoisting and milling will soon be done.

CALAVERAS COUNTY.

Hercules-Horseshoe.—This group, at Murphys, Eugene Deleray superintendent, is to have an overshot water wheel for water power instead of using a gasoline engine.

Mayday.—This group, at Murphys, is being developed by opening shafts at the top of the mountain.

Rancho.—This mine, in Salt Spring valley, recently bought by Mr. Smart, is being unwatered and six men are at work.

MARIPOSA COUNTY.

Exchequer Mining Co.—Work on this mine, near Hornitos, Miles O'Brien superintendent, has been stopped, awaiting hoisting machinery. A dam is also to be put in to furnish water power.

NEVADA COUNTY.

Banner.—At this gravel mine, on Canada hill, A. Charronat superintendent, a hoist will be put in the tunnel, which ran in above the gravel.

California Mining Co.—A 10-stamp mill is being put upon this mine, on Gaston ridge.

Gold Blossom.—Some high-grade milling ore has been uncovered in this property, Richard Jeffrey owner. The third payment on the bond was not paid and the bond lapsed.

Lamarque.—At this mine, at Grass valley, Charles Brockington superintendent, new machinery is be put in for development work.

Sierra Queen.—At this mine, Grass valley, 26 men are at work and developments are being pushed. Last month 760 tons of ore were milled.

PLACER COUNTY.

Gold Blossom.—J. E. Walsh, manager of this property at Ophir, has bonded it to Alameda and San Francisco people, who will unwater it and proceed to sink and develop.

SAN BERNARDINO COUNTY.

American.—These seven mines, seven miles south of Amboy, have been bonded by Marcus Cluff to Posey & Bayley, of Los Angeles. A number of open cuts have recently been made across the outcrop, showing ore.

SAN DIEGO COUNTY.

American Girl Mining Co.—This company, at Ogilby, and the Anglo-American Consolidated Mining Co. have placed on record a trust deed conveying to W. J. Doran, of Los Angeles, trustee, six claims in the Cargo Muchachas district, with all machinery, buildings, etc. The understading is supposed to be that the trustee shall liquidate the indebtedness of the American Girl Co. An option has been given to other parties to buy.

Cleveland Pacific Mining Co.—This company, near Escondido, has put in a new 80-h.p. boiler and it is reported that a smelter is to be erected.

Cuyamaca Ranch & Mining Co.—This company has been working the old Stonewall mine, on the Cuyamaca ranch, a few miles from Julian. A new company has been organized to succeed to the ownership, and S. H. Lucas is to take charge as he did for the old company. The mine has been worked to the 600-ft. level by a three-compartment shaft, and it is proposed to continue this shaft to 1,000 ft: and then run north about 200 ft., to where a pay shoot is believed to exist.

SAN LUIS OBISPO COUNTY.

A company, headed by J. Worden, is putting up a five-ton furnace on a quicksilver property near Parkfield.

Klau.—This quicksilver mine, west of Paso Robles, is now employing 100 men and is being worked through three tunnels. A Scott furnace is in use and the mine is now producing.

SHASTA COUNTY.

Mountain Copper Co.—At the smelters of this company, Keswick, Lewis T. Wright superintendent, electrical power has reduced the

number of employees by 75. Five furnaces are in operation.

Mountain Lion.—The owners of this property, at Clear Creek, have decided to put in a mill and cyanide plant.

SISKIYOU COUNTY.

Golden Eagle.—An air compressor and mill are to be put on this mine, at Indian creek.

New York.—At this mine, Indian creek, they have struck the ledge again at a depth of 500 ft. J. B. Scott, the superintendent, is keeping the mill running with two shifts.

Wright & Fletcher.—This hydraulic mine, at Oro Fino, has been kept in steady operation all winter with an abundance of water.

TULARE COUNTY.

Josephine.—At this mine, White river, S. W. Steffuer superintendent, the shaft is down 150 ft. and drifts have been run both ways at the 100-ft. station. A 10-stamp mill and cyanide plant are to be put up.

COLORADO.

BOULDER COUNTY.

(*From Our Special Correspondent.*)

Boyd.—This mill, at Boulder, has been leased by the Progressive Concentrating & Milling Co., owner of the Tetrault concentrating table. Necessary repairs are being made, and the plant will soon start with a capacity of 30 tons daily, as a custom mill.

Enterprise Mining & Reduction Co.—This company, consisting principally of Boulder men, intends within a short time to start up the chlorination plant at Eldora, which has been idle some time. The Enterprise ore will be treated, enough being reported developed to keep the mill running for six months at the rate of 50 tons per day.

CLEAR CREEK COUNTY.

Centurian.—A good strike is reported in this tunnel on Trail creek on the Champion lode. The vein is cut about 1,000 ft. in and a winze was sunk on the ore body. At a depth of about 35 ft. a 2-in. vein was cut, said to show 14 oz. gold, 46 oz. silver and 7.35% copper. Fred. Nye is manager.

CUSTER COUNTY.

Bassick.—Large ore shipments continue. New ore bodies are reported opening up. The equipment is to be increased this summer.

Little Jim Mining Co.—This company, of Pueblo, working the Aburdix group at Querida, has resumed operations. The company will work the Elematah shaft, which is down 400 ft. John Freize is manager, and R. L. Nofe is superintendent.

FREMONT COUNTY.

Swallow Tail.—Machinery will shortly be placed on this group in the Verde district, including a duplex compound air compressor and Rand drills. The tunnel is in 150 ft., and will be extended 200 ft. farther.

Valley.—At the 140-ft. level of this mine, near Florence, a streak of lead ore 4 to 8 in. wide is exposed for 200 ft.

GUNNISON COUNTY.

Spar.—Landrigan & Timm have transferred this group, near White Pine, embracing 38 acres to the Spar Copper Mines & Tunnel Co., of which A. F. Downs, of Davenport, Ia., is president, and John Landrigan, manager. The property was formerly known as the Morning Glim, and has a 750-ft. tunnel on the vein, with 325 ft. of stoping.

Brunswick Mining Co.—The Blistered Horn tunnel, being driven by this company, is in nearly 1,000 ft. and has cut an 8 ft. and a 17 ft. vein. The latter was cut at 550 ft. This vein has opened ore reported to assay from $250 to $600 a ton. The 100-ton mill, owned by the company in West Willow gulch, just below the mine, is to be remodeled this spring and operated. The company has assurance of much ore in the Jimmy Mack mine to run its mill on. Andrew Lejune is manager.

West Gold Hill Co.—A 50-ton cyanide mill will shortly be built by this company in the Gold hill district. It has a contact vein which crosses its property for 3,000 ft. It is developed by tunnels, the deepest being 287 and 375 ft. respectively, each showing ore the entire distance in veins from 4 to 18 ft. in width.

Woods Gold Mining Co.—The 100-ton mill of this company in Pie Plant gulch is completed, and will soon be in operation. The company opened a 5-ft. vein of free milling ore last fall, which is reported holding out well.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

Blaine.—This property resumes May 1. A new shaft will be sent down from the tunnel workings, now in about 50 ft., and 80 ft. will put the shaft into a known ore body of fair grade material.

Bon Air.—In addition to taking out good ore, a great deal of prospecting work is being done in virgin ground.

Cloud City.—The plant is being improved preparatory to more active work.

Fryer Hill Mines Co.—While shipments are regular, the new Harvard shaft is going down, and sinking will be completed about May 15. The drift run 165 ft. from the old El Paso workings to connect with the new shaft has been completed under the Harvard ground.

Gnome.—Work is to be resumed by Leadville men, who will sink the shaft deeper.

Helen Gould.—Work is to be resumed on the main vein by lessees. This ore was uncovered just before the shutdown, and is a fair grade copper material.

New Monarch Mining Co.—About 100 tons a day of good ore are coming from the old workings. The Cleveland shaft is opening up large bodies of copper sulphides.

Ollie Reed.—Another big shipment of rich gold ore has been made, while new development and prospecting work is being carried on.

Sedalia Gold Mining Co.—The judgment held by Henry Head against this company has been paid, and it is announced that preparations are being made to resume. The property is on the gold belt and large bodies of low grade ore are opened.

Tenderfoot.—This is virgin gold belt territory and is to be developed under Timothy Goodwin. Shaft houses and other new buildings with important machinery are being put in.

Virginius.—While pushing prospecting work into virgin ground regular iron shipments are coming steadily from the old workings of this property.

Yak Mining, Milling & Tunnel Co.—The company is shipping about 3,000 tons a month, and has begun work on new territory lying along the tunnel route, including the old Tankerstown claim. An electrical installation is planned.

Wallace.—Good iron ore is being shipped while new work is under way.

MINERAL COUNTY.

United Mines Co.—This company, of Creede, has purchased the properties of the Winchester Mining Co., and the Sewell Mining Co., consisting of nine claims lying west of the United Mines property. The United Mines Co. agrees to pay one-fifth of all royalty from all ores mined upon the premises, or that may hereafter be acquired, lying between and bounded by the end lines of the new properties, and in case the mines should be worked and operated by the United Mines Co., and not by its lessees, to pay a dividend to the parties owning the Winchester and Sewell Mining Co., of one-fifth of all net profits realized from the workings of the mines lying between the end lines.

SAN JUAN COUNTY.

Alpha Mining Co.—At this property, on Tower mountain, an electric drill will be installed and work on the Eureka tunnel pushed. The company is planning to instal a tram and build a mill as soon as the work on the tunnel justifies.

Astor Mining Co.—This company, it is reported, is to push work on the South Fork Eureka gulch Mogul tunnel until that vein is cut. The machinery for the milling plant will soon be on the way, it is stated. It consists of two 150-h. p. marine boilers, engine, crusher, stamps, concentrators, etc., capable of handling 100 tons of ore per day. The Toltec tunnel, through which the greater supply of ore must come, is now in 965 ft., with probably 200 or 300 ft. to run before the vein is encountered.

Copper King.—This property, on Boulder mountain, shows improvement as development advances. The tunnel is now nearly 300 ft. long, showing an ore body 5 to 6 ft. wide, running about 25 oz. silver per ton.

Northern Light Mining Co.—Conyers Bros. and Herman Strobe have disposed of 31 mining claims off West Boulder mountain to this company, the consideration being $14,000. The claims bound the Northern Light's former purchase from Graham, et al, on the south. The old Ariadne mine has also become the property of the Northern Light Company.

San Juan Mining & Leasing Co.—The Silver Ledge mill, of this company, at Chattanooga, held under bond and lease, will be equipped with electric separators and other devices for freeing the lead and copper product from its zinc connection with the aerial tramway.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Abe Lincoln.—It is understood that this property in Poverty gulch, close to the city limits of Cripple Creek, is shipping about a car a week of good grade ore. It belongs to the Stratton estate and is worked under lease by Milton Smith and others of Denver. Walter Swanson, of Cripple Creek, is in charge.

Elkton Consolidated Gold Mining Co.—It is understood that the lower levels on this property will soon be in shape to work, due to the draining by the El Paso tunnel. There was a large amount of ore in sight when the work was stopped. A number of other neighboring mines are being drained by the tunnel, which has undoubtedly proved a great success.

Old Gold.—The struggle for control of this company goes on. A number of circulars have been issued by the different factions of stockholders. The work of getting ready to work on company account is pushed.

Wild Horse vs. Londonderry.—This suit has been on trial during the past week in the District Court, and will probably be the greater part of the coming week. A number of the chief mining engineers of the State are giving testimony.

IDAHO.

BOISE COUNTY.

Black Pearl Mining Co.—This company, in the Pearl district, north of Boise, has the shaft down nearly 300 ft. Drifting will soon begin. Superintendent Anderson has 18 men at work. A 100-ton mill has been ordered, to be completed in early fall. The Allis-Chalmers Co. will furnish the machinery.

IDAHO COUNTY.

Black Lake.—This company, near Grangeville, is preparing to put in a 100-ton cyanide plant this summer to fill the place of the one destroyed by fire last fall.

Dewey.—The dam and bridge at this mine, on the South Fork of the Clearwater, were destroyed by high water recently, causing a loss to the company from $15,000 to $20,000. The Dewey company has been putting in an electric power plant with which to run the mine. The Dewey mine is owned by Math Jacobs, of Spokane, and associates, and is managed by Otto Abeling. The company has been planning the erection of a 100-ton Hendryx cyanide mill, and a Maine man has been looking into the company with a view to supplying the funds. The destruction of the dam may interfere with plans for developing the property.

Iron Springs.—A 100-ton cyanide plant is planned this spring for this property near Grangeville.

ILLINOIS.

(*From Our Special Correspondent.*)

All the coal mining districts throughout the State have made their agreements for the next two years, and the mines have settled down to normal conditions. To facilitate adjusting differences and disputes, the executive board of

the Illinois Operators' Association has authorized its president to employ three special commissioners to act in conjunction with Commissioner Herman Justi, and Secretary C. L. Scroggs. Up to this time only two of the three have been appointed. They are W. R. Russell, of Vandercook, Ill., former State president of the United Mine Workers, and for the past year commissioner of the Danvill district Coal Operators' Association, and Edward Cahill, of Virden, Ill., for the past year State vice-president of the United Mine Workers.

INDIANA.

CLAY COUNTY.

(From Our Special Correspondent.)

There are fears of a strike in the block coal field because of the demand of the miners for extra pay for low coal mined by machinery. The operators have not heretofore paid extra for such work, although the miners have yearly demanded it. It is understood that the National Association has approved their course and will give them aid in case of a strike.

The United States Geological Survey has issued a bulletin on the Palotta quadrangle. Messrs. M. L. Fuller and F. G. Clapp recently examined the territory. Investors have been awaiting the report for some time. The report says that the beds are rarely much over a foot thick and are often too impure to be of any value. In the Indiana portion of the quadrangle there are but two mines—the Oswald, at Princeton, and the Diamond, near Evansville. These reach what is known as the Petersburg coal. At the Diamond mine the coal is 250 ft. below, overlain by 2 ft. of black shale, forming a good roof. A band of sulphur occurs in the middle of the coal. In the Oswald mine the coal is reached at about 450 ft. and averages 6.5 ft. thick. It is a good, firm coal, without regular sulphur or clay bands, but thin bands of sulphur are abundant in places.

PIKE COUNTY.

(From Our Special Correspondent.)

Bradford.—This coal mine, near Petersburg, caught fire on April 18 and is now burning. Two years ago the mine tipple burned to the ground and the solid coal caught fire. The opening was stopped and a new opening made. Recently miners worked into one of the old openings and found the rock still smoldering. The fire soon spread to the new openings. There is no water available to flood the mines, and their loss is threatened.

VANDERBURG COUNTY.

(From Our Special Correspondent.)

Arnold.—One hundred coal miners employed at this mine, a few miles south of Evansville, are on strike because of the discharge of one of the engineers, who was told to turn off some escaping steam and refused, saying it was not his work. An attempt is being made to settle the matter by arbitration.

MONTANA.

CASCADE COUNTY.

(From Our Special Correspondent.)

Boston & Montana.—Henry N. Wood has gone to St. Louis to install and take charge of the exhibit prepared by these works for the exhibition. The exhibit will consist of ores in various stages of reduction and refinement, including mattes, slags, flue dust, refined copper in pigs, anodes and cathodes and 40,000 lb. of wire bar and ingots. The display will be independent of any exhibits from the Butte district proper. At the entrance to the Montana exhibit there will be a 12-ft. column of refined copper; there also will be a block of silver, copper and gold, made at the silver plant by electrolytic refining showing the proportion of these metals. The works at Great Falls have taken great pains in preparing this exhibit.

JEFFERSON COUNTY.

(From Our Special Correspondent.)

Copper Mountain Mining Co.—This company, just organized, is developing its property by sinking a shaft 500 ft. deep about one mile northwest of Corbin. J. H. McCabe is the general manager. The company owns something like 50 quartz claims, all of which are in an early stage of development.

Minah.—Butte men have secured from J. O. Brisco a lease and bond on this property, near Wickes.

Reliance.—This group, on High Ore gulch, is being operated by the Red Bird Mining Co., of Helena. A steam hoist is in place. The work is producing a good amount of smelting ore, paying the expenses of the development. The property laid dormant for several years, no one having sufficient courage to tackle it, being fearful that the water could not be handled.

LEWIS & CLARKE COUNTY.

(From Our Special Correspondent.)

Red Bird Mining Co.—A strike of copper ore is reported in this property, 9 miles west of Helena. The company is regularly shipping iron ore to Butte. Drifting from the lower level has cut a body of copper ore 35 ft. from the shaft. The regular monthly dividend—the fifteenth—was paid April 1. Samuel Punches, of Helena, is the manager.

Bell Boy.—J. H. McCabe has secured from Messrs. Wetmore & Byrnes a two-year lease and bond on this old property, near Empire. The Bell Boy has been worked to a depth on the incline of 250 ft. The ore is gold-lead and about $200,000 worth has been shipped. The incline shaft is 350 ft. deep, but no stoping has been done below 250 ft. The lead on the surface is free milling gold, having an average milling value of $5.

MISSOULA COUNTY.

(From Our Special Correspondent.)

Woods Placer Co.—This company has again taken possession of the Hughes creek diggings, which were operated last year by J. A. Nelson, of Minnesota, under a contract to purchase for $100,000. Nelson claims to have discovered that the Woods Co. could not give good title and threw up the contract.

SILVER BOW COUNTY.

(From Our Special Correspondent.)

Taylor & Brunton Sampler.—These works handled 16,000 tons of ore during March, about evenly divided between copper ore and a highly silicious ore. All went to the Washoe works, at Anaconda. The Taylor & Brunton Co. will soon be ready to receive shipments of lead-silver ore from the entire Northwest. Heretofore shipments have been confined to a region within a radius of 100 miles of Butte.

PENNSYLVANIA.

ANTHRACITE COAL.

Kingston Coal Co.—This company, employing some 4,000 men in and about its collieries near Plymouth, has decided to submit the question of docking to arbitration representing the company and the miners.

Pine Brook.—The breaker at this colliery of the Scranton Coal Co., controlled by the New York, Ontario & Western Railroad, caught fire on April 26 and burned to the ground. The breaker, a large structure, was near the center of the city of Scranton. As nearly all the employees were away for dinner there was no loss of life. The property loss is estimated at $75,000. The breaker stood at the shaft, but some 600 men and boys who were underground were warned and escaped by other openings.

BITUMINOUS COAL.

The Altoona agreement, which established the wage rate at union mines from April 1, 1904, to April 1, 1905, provides that the pick mining price shall be 62c. per gross ton; that machine loading shall be five-ninths of the pick mining rate, plus 0.5c. per ton; that machine cutting and scraping, whether by the day, ton or board, shall be reduced 6.06%. All other labor inside and outside of the mines shall be reduced 5.55% below present wage scale, with the exception of blacksmiths and carpenters receiving less than $2.25 per day, and other outside day labor receiving less than $1.85 per day, who shall not be reduced; and, provided further, that blacksmiths and carpenters receiving more than $2.25 per day shall not be reduced below $2.25 per day in the application of this reduction. All dead work to be reduced 6.06% on present rates. All monthly men and all those engaged in the manufacture of coke to be reduced 5.05% on existing rates.

Berwind White Coal Mining Co.—This company, which makes no formal wage agreements with the United Mine Workers, has reduced the wages of its machine miners 6% and of its other labor 5%.

Twolick Creek Coal Co.—This company has been organized to develop deposits of coal in the Twolick valley in Indiana county. The corporation is composed of R. and F. Peale, J. L. Mitchell, of Ebensburg; Harry and J. O. Clark, of Glen Campbell, M. O. Watson, of Indiana, and E. H. Ellsworth, of Arcadia. The company owns 10,000 acres. Openings will be made and a town laid out near Porterfield. It is the intention to mine 1,000 tons of coal daily.

W. K. Niver Coal Co.—This company has installed in the mine near Berlin, a 20-ton electric motor capable of pulling 20 loaded cars up the steep slope of the mine.

MARYLAND COUNTY.

Mining companies in the Georges creek region have reduced the mining rate 5c. per ton, making it 60c.

SOUTH DAKOTA.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Wauconda Mining Co.—This company, with claims aggregating 250 acres in the Elk creek district, 3 miles southeast of Lead City, is installing a hoist and preparing for the season's work. Water rights on Big Elk creek are being secured.

Spearfish Gold Mining & Reduction Co.—A dividend of 1c. a share, $15,000, has been declared, payable May 1. The ore at the mill is averaging 30% better than one year ago.

Penobscot Mining Co.—The cyanide plant is treating from 100 to 125 tons of ore daily, extracting nearly 90% of the values. The unoxidized ores may be treated as well by cyanide in the raw state as by cyanide or chlorination after roasting.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlements.—Salt Lake City banks reported settlements aggregating $469,000 during the week ending April 22.

BEAVER COUNTY.

(From Our Special Correspondent.)

Majestic.—The properties of this corporation are closed down entirely pending a settlement of the company's financial affairs. The proceedings in bankruptcy brought in the Federal court at Salt Lake come up for hearing April 29.

DEEP CREEK COUNTY.

(From Our Special Correspondent.)

Midas.—This plant in the Clifton district is operating again. It is equipped to treat ores by the cyanide process, and is now treating from 20 to 40 tons daily.

Stockton Gold Mining & Milling Co.—This Stockton property is to be equipped with a new hoisting plant shortly. J. J. Trenam, of Salt Lake, is manager.

IRON COUNTY.

(From Our Special Correspondent.)

Colorado Fuel & Iron Co.—It is stated that this company will soon begin developing its iron properties in this county with diamond drills.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Ore Shipments.—For the week ending April 22, shipments aggregated 158 carloads, as follows: Centennial Eureka, 50; Tetro, 3; Yankee Con, 3; Uncle Sam, 1; Grand Central, 19; Carisa, 8; Mammoth, 11; Ajax, 2; Victor Con, 1; Lower Mammoth, 2; Tintic iron, 9; South Swansea, 1; Gemini, 18; Bullion-Beck, 11; Eureka Hill, 19.

Carisa.—A contract to sink this shaft 200 ft. deeper is about to be let by H. S. Joseph, manager.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Consolidated.—The fourth furnace at this plant has been placed in commission. The plant is treating about 700 tons of ore daily. The shipments of copper bullion for the week ending April 23 aggregated 182,327 lb.

Boston Consolidated.—Samuel Newhouse, managing director, has secured an option on 117 acres of land near Bingham Junction for reduction works purposes.

United States.—The shipments of copper bullion from this plant during the week ending April 23 aggregated 254,923 lb.

Utah Consolidated.—The structural steel for the additional smelter buildings is now being set up and will be in place within two or three weeks. The plant will be ready for commission about July 1. Shipments of copper bullion from this plant during the week ending April 23 amounted to 302,000 lb.

Utah Copper Co.—This plant is now handling about 500 tons of ore daily. The crushing capacity is upward of 1,000 tons and D. C. Jackling, the manager, has announced that the concentrating department will shortly be enlarged to meet the capacity of the crushers.

WASHINGTON.

FERRY COUNTY.

Hawkeye Mining & Milling Co.—This company, operating in the Lambert creek division of the Republic district, adjoining Belcher camp, has been reorganized and the property is in new hands. The ore is mostly iron and copper sulphides and work will soon be resumed.

COWLITZ COUNTY.

Darnell Mining & Milling Co.—All the buildings, machinery, charter and mining rights of this company at Kalama were sold recently by the sheriff to satisfy a labor lien of $425. The company had expended about $40,000 on the development work and machinery and buildings and the total receipts from the sale were less than $1,000.

STEVENS COUNTY.

Chewelah Copper King Mining Co.—This company owns the Copper King mine near Chewelah, which is developed by 3,500 ft. of tunnel, shaft and drifts. The main tunnel is 1,300 ft. long and has opened up three shoots of ore assaying $40, $18 and $14, respectively. The ore is copper and carries a good percentage of iron.

King Gold & Copper Mining Co.—This company, working the old Edna mine, near Valley, recently elected the following officers: President, J. B. Tuttle, Sr.; vice-president, J. T. McAviney; secretary and treasurer, J. B. Tuttle, Jr. The mine is equipped with three 50 h. p. boilers, a 35 h. p. steam hoist, air compressor, steam drills, steam pumps, electric light plant, shops, boarding house, ore bins, etc. A depth of 370 ft. has been reached in the shaft, with drifts every 50 or 100 ft. to the 350-ft. level, where a 250-ft. drift has opened an ore body.

WHATCOM COUNTY.

Nooksack Mining Co.—The machinery for the mill of this company near Whatcom is going in and the 80 stamps are expected to be in operation in about two months. The foundation is already in and the old stamps taken out. The cyanide plant will handle 200 tons of ore which will go through 72 hours of leaching. C. F. Bernard is president, and J. Swinehart, secretary.

WYOMING.

CARBON COUNTY.

North American Copper Co.—The ore crusher at the smelting plant of this company at Encampment is running full blast, and the smelter will begin operations shortly. The company has 4,000 tons of ore in the bins and about 6,000 tons of ore are blocked out in the mine. The tramway, smelter and other plants have been repaired and rebuilt at a cost of $12,000. When everything is running full blast there will be about 300 men employed.

SHERIDAN COUNTY.

(From Our Special Correspondent.)

Carney Coal Co.—This company has purchased the Birchby coal property, on Tongue river, 7 miles from Sheridan, and is preparing to begin work on a large scale. Bids have been asked for the construction of 30 new dwellings for employees. Work will soon begin on the tipple and sinking a shaft. Machinery of the latest type is to be installed, including an electric light plant. The company intends to produce 1,500 to 2,000 tons per day.

FOREIGN MINING NEWS.

AFRICA.

TRANSVAAL.

The production reported for March was 299,625 oz. fine gold, from the Witwatersrand, and 8,617 oz. from outside districts, making a total of 308,242 oz. for the month. This compares with 289,502 oz., in February, and 217,465 oz., in March, 1903. For the three months, ending March 31, the total was 886,568 oz., fine gold, against 613,257 oz. in the corresponding period in 1903; showing an increase of 273,311 oz., or 44.6%, this year.

ASIA.

INDIA-MYSORE.

Kolar Gold-field.—The output of the gold mines in this district in March was 51,634 oz. bullion, being 1,483 oz. greater than in February, and 3,307 oz. more than in March, 1903. For the three months ending March 31 the total was 153,473 oz. bullion, against 142,675 oz. in the corresponding period in 1903; showing an increase of 10,798 oz. The total reported this year was equal to 138,126 oz. fine gold, or $2,855,064 in value.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending April 16 shipments amounted to 12,882 tons as follows: Granby, 8,850; Mother Lode, 3,930; Emma, 69; Oro Denoro, 33; total for the year to date, 244,416 tons.

Montreal & Boston Consolidated Mining & Smelting Co.—This company is to be organized to merge several properties in the Boundary district. An arrangement has been made with a syndicate to turn in to the new company the following properties, or control: Dominion Copper Co., Ltd.; Morrison Mines, Ltd.; Athelstan & Jack Pot Gold Mining Co., three-quarters interest in the Emma mine, and $150,000 in cash for working capital and expenses. The capital stock of the merger will be $7,500,000, of which $1,000,000 will remain in the treasury and $1,500,000 deposited with the Knickerbocker Trust Co. of New York for exchange with the shareholders of the Montreal & Boston Copper Co., Ltd., on the basis of one share of stock of the merger company for two shares of the Montreal & Boston Copper Co., Ltd. The balance of $5,000,000 capital stock to be issued to a syndicate, which will turn in the properties and also pay into the treasury of the company $150,000 for working capital. Among the men who are to figure in the consolidated company are said to be H. H. Melville, of Boston; J. W. Allison, of New York; J. N. Greenshields and William Mitchell, Montreal; Thomas Crockett, Riviere du Loupe, Canada; G. Creighton Webb, of New York; Delancey Nicoll, of New York; W. A. Beal, of Boston; W. N. Coler, Jr., New York; Charles M. Jessup, New York; John Macdermid, Montreal, and John F. Plummer, New York.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—For the week ending April 16 shipments aggregated 2,953 tons, as follows: Le Roi No. 2, 440; same (milled), 300; Centre Star, 1,157; War Eagle, 766; White Bear, 200; Spitzee, 90; total for the year to date, 126,917 tons.

Giant Mining Co.—Spokane stockholders of this company of London, owning the Giant mine at Rossland, have organized to fight the foreclosure suit brought by the London holders of the debentures. An accounting is also sought as the company is in debt and the treasury empty. The question is being raised as to the legality of the sale made two years ago to the London company, when the Spokane owners received 6c. per share, a part of which was taken in stock in the new company. The mine, when owned by the Spokane men, was incorporated for 2,500,000 shares of $1 each. Under the London company, which was formed three years ago, it is incorporated for 150,000 shares of £1 each.

BRITISH COLUMBIA—SLOCAN DISTRICT.

Queen Dominion Mining Co., Ltd.—This company has incorporated under the laws of British Columbia and has acquired the interests of the Queen Bess Proprietary Co., in the Queen Bess, American Girl and several other claims above the Alamo concentrator, near Three Forks. The former owner was an English company, which lost the property through a foreclosure sale. The leaders in the new company are George D. Potter, of Spokane; Robert Irving, of Kaslo, and W. E. Zwickey, of Kaslo, superintendent of the Rambler-Cariboo. Work has been resumed and a portion of the workings leased.

BRITISH COLUMBIA—SOUTHEAST KOOTENAY DISTRICT.

St. Eugene.—This mine near Moyie will commence shipping ore about May 1 and will employ about 250 men. James Cronin, of Spokane, is manager. John A. Finch is part owner.

MEXICO.

JALISCO.

Barranca del Oro.—These mines and reduction works were sold recently by Lonergan and Stanhope, of Ixtlan del Rio. Senor Senolon, of Tepic, is the new proprietor, and will continue operations. The ores are free milling. Besides extensive workings underground, there is a 10-ton stamp mill and concentrating plant. This camp is seven hours' ride west of San Marcos.

NUEVO LEON.

Asuncion.—T. S. Moorhead, of Washington, D. C., has leased these mines on White mountain, Monterey, from the Mexican Mining & Exploration Co. An aerial tramway will be put up at once to run from the mines to the Mexican National Railway, two miles distant.

SONORA.

Providencia.—The Providencia Gold & Silver Mining Co. is about to resume work on this mine, consisting of 12 pertenecias, near Nacozari. A 10-stamp mill is to be erected and Sam Fields, of Wyoming and Colorado, is the manager. The officers are: H. E. Stone, president; W. E. Bayliss, vice-president; Frank Gilland, secretary; T. A. Rendle, treasurer. The board of directors include the officers named and A. F. J. Shropshire, S. F. Forbes and Albert Stacy. The vein of the Providencia, averaging 3 ft. wide, has been traced 1,500 ft. by shallow shafts. The ores are silver-gold and it is claimed that they can be sorted to run $50 in gold and silver to the ton.

TEPIC.

Buena Vista y Anexas.—Ten new Huntington mills are going in at these mines near La Yesca. Concentrators are also being put in. Everything has been cleared up from the explosion of January 2, which wrecked buildings and the compressor plant. Juan McGrath is manager of the property.

SOUTH AFRICA.

TRANSVAAL.

Robinson.—In this mine, near Johannesburg, on April 26, the breaking of a cage allowed 43 native miners to fall 2,000 ft. down the shaft.

SOUTH AMERICA.

BRITISH GUIANA.

Exports of gold from the colony for the three months, ending March 31, were 15,176 oz. bullion, against 16,937 oz. in the first quarter of 1903; a decrease of 1,761 oz. The total this year was equal to 12,582 oz. fine gold, or $265,726 in value. Exports of diamonds were 2,221 carats, valued at $16,900, against 1,700 carats, valued at $13,578, last year.

MINING STOCKS.

(Full quotations given on pages 708 and 709.)

New York. April 27.

Generally speaking, the stock market is weaker, but the comparatively small sales would indicate that professional operators are still conspicuous in the speculative arena.

Amalgamated Copper sold down to $47,875, while Anaconda moved at $17.56. Montreal & Boston, of British Columbia, present stock sold moderately at less than $1, while the new consolidated shares "when issued" were quoted at $1.25@$1.875. The capital stock of the new incorporation, the Montreal & Boston Consolidated Mining & Smelting Co., will be $7,500,000 (par $5), of which $1,000,000 will be retained in the treasury for future needs, and $1,500,000 deposited with the Knickerbocker Trust Co. for exchange with Montreal & Boston stockholders at the ratio of two shares of the old stock for one of the new. The remaining $5,000,000 of stock will be used by a syndicate to purchase control in the Dominion Copper Company, the Morrison Mines, Athelstan & Jack Pot Gold Mining Co., and three-quarters interest in the Emma Mine. There will be $150,000 laid aside as working capital. British Columbia Copper Co. sold at $1.875@$2. Greene Consolidated, of Mexico, showed small transactions at $15@$15.875.

Standard Consolidated Gold, of California, reappeared at $2.50@$2.55, and Horn Silver, of Utah, at $1.45. Ten shares of Homestake of South Dakota, sold at $51.875, an advance of 1⅞ points over the previous sale.

Of the Colorado stocks Elkton Consolidated, of Cripple Creek, changed hands at 66@67c., and El Paso, at 82c.

Comstocks are quiet. Consolidated California & Virginia, with a 25c. just levied, weakened to $1.75. Ophir rose from $5.375 to $5.50, and Mexican stood at $2.20@2.25.

Boston. April 26.

(*From Our Special Correspondent.*)

Copper shares have sympathized with the weakness characterizing the New York list, and there is an under-feeling of disappointment in the whole market situation. This is especially felt in view of the strong metal market and the knowledge that copper mining companies are getting the benefit of the enhanced value of the metal. However, it is felt that the increased earnings must have some effect on stock market prices ultimately. News has no effect whatever.

Daly West has gone up $3.50 to $25, as the offering of stock has subsided. This stock has been added to the clearing-house list. United States Mining, on the liquidation of a few hundred shares, touched $19.75. Stillman & Kelly resigned as a director some months ago, but it has just been announced. It is estimated that four United States Mining directors own over 150,000 of the 400,000 shares of the stock. Earnings are about $100,000 per month.

Copper Range Consolidated touched $39.75, but rallied $1 to $40.75, which is $1.50 below a week ago. Old Dominion has been quiet with a few sales at from $12.37½ to $13. Net earnings for March were $39,000. A net profit of 1c. a pound was made on the sale of pig copper. Shipments for 18 days of this month amounted to 950,000 lb. Centennial sagged to $18.75, recovering to $19.25. There is no animation in this stock. Parrot has lost $1 to $23. Nothing is heard about a dividend payment by this company. Allouez has been off to $4.62½. Either a $2 or $3 assessment will be levied by the Allouez management within the next 60 days, which will be made in easy payments. Bingham went fractionally lower to $21.25. The fourth furnace has been started at this company's smelter. Consolidated Mercur drifted off to 33c., recovering 2c. It is learned that the March earnings were about equal to the operating cost. Guanajuato spurted to $2, holding most of the gain. March earnings of the latter were $12,000 net, Mexican currency.

Quincy mining is off $3 to $82 and Osceola $2 to $55.50, but Tamarack has advanced $2 to $92. Montana Coal & Coke spurted to $3.62½ to-day on advices that a new seam of coal had been opened. Boston Consolidated has been active on the curb, selling up to $6.50 to-day.

It is estimated that a line of 20,000 or 25,000 shares of Greene Consolidated has been taken for Boston account lately, and there is a likelihood that it may be listed on the local exchange.

Colorado Springs. April 22.

(*From Our Special Correspondent.*)

The market on the Colorado Springs exchange closes the current week in better condition than for some time past. For the past several weeks the volume of trading has been small, and the quotations either stationary or declining; but at the beginning of this week a reaction set in, resulting in considerable activity and better prices. The cause of the strength in the market can be traced directly to several strikes, of more than ordinary importance, in the Cripple Creek district during the past ten days. The richest of these late finds is one made in the property of the Missouri Co., on Gold hill, where a body of ore running well up into values per ton was uncovered by a lucky lessee. The stock of this company practically doubled in selling price as a result of this strike. Several finds of importance were also reported from Beacon hill, the Henry Adney Co. claiming the richest of these. The prospects for a more active market are encouraging at this time, although a reaction from the present advance is to be expected.

Salt Lake City. April 23.

(*From Our Special Correspondent.*)

The mining stocks sold on the Salt Lake Stock & Mining exchange during the week ending April 23 brought the sum of $28,412. The trading was confined in a great measure to the low priced speculative stocks. Consolidated Mercur dropped from 45 to 32c., and was exceedingly weak at the close. It is believed it will go still lower. The announcement made by an officer of the Sacramento that the stockholders need not look for a dividend during the month of May had a depressing effect and the stock declined. Daly West, while it reached the lowest point in many months, recovered slightly at the close. There was very little Grand Central offered, although there was demand for it at times; it closed higher. A small lot of Ontario, offered at $3.85, was taken. Star Consolidated made no gains, nor was it expected, as the fight for control is still pending. The surprise of the week came in the announcement of a dividend from the Salvator mine of Tintic. The stock is not listed, but bids of $2 a share made on the street were not accepted. The stock is closely held. There was no trading done locally in the more important Bingham stocks.

San Francisco. April 21.

(*From Our Special Correspondent.*)

Dealing in the Comstock shares was rather active part of the week, and prices were generally good, with an occasional upward spurt. The trading, however, was mostly among insiders, and the general public appears to be taking very little interest in the market just now.

Some quotations noted are: Ophir, $5.75@$6; Mexican, $2.25@$2.35; Consolidated California & Virginia, $1.75@1.80; Hale & Norcross, 85c.; Sierra Nevada, 74c.; Silver Hill, 60c.; Overman, 38c.; Chollar, 25c. per share.

On the San Francisco & Tonopah exchange business was quite active, and sales were on a considerable scale. Montana Tonopah brought $1.50; Tonopah Belmont, 65c.; Tonopah Midway, 38c.; McNamara, 18c. per share.

On the California exchange business in oil stocks was rather quiet, but there were quite a number of sales and prices showed no weakness. There was one sale of Hanford at $180; Four Oil brought 59c.; Oil City, 44c.; Independence, 22c. Associated Oil certificates were in quite strong demand.

COAL TRADE REVIEW.

New York, April 27.

ANTHRACITE.

A spring as backward as this naturally affects the consumption of coal for domestic purposes, consequently retail buying all over the country is much heavier than is ordinarily the case at the end of April. This demand influences wholesale trade somewhat, but the chief reason for the active demand at wholesale is the discount system. Sales agents report far more coal ordered that could possibly be delivered during the month, yet they are trying to avoid contracting at May prices, chiefly because the discount system is now so well appreciated. Many dealers and large consumers put in their orders as soon as the spring prices are announced, and while each wishes to get all his coal at the April discount, it is understood that this is impossible, and the orders are filled proportionately from the tonnage available, coal delivered in April getting the April discount and that in May the May discount. The present outlook is for a good average year's business.

The steam sizes, now that steam-heating plants have less to do, are naturally not in strong demand. Several companies, particularly the Delaware, Lackawanna & Western, have increased the output of these sizes by the erection of new washeries, etc., considerably within the last few years, and when demand falls off the washeries work shorter time. The drop in the prices of bituminous coal and the water power available for those concerns that use both water and steam power also contribute to cut down the demand for the steam sizes.

Trade in the Northwest is seasonably active, No coal is expected at Duluth till after the middle of May, and by then there will be much less coal on dock than seemed likely last fall. In Chicago territory there has been a great rush of orders for coal at the April prices. The arrivals of all-rail coal have been altogether insufficient to meet the demand, and there is no prospect of coal arriving by lake for some time. It is reported that some coal is being sold for May delivery at April prices, owing to the inability to get coal forward by lake this month. Along the lower lakes and in Canadian territory the orders have been heavy and a large amount of coal will go forward in May. Present indications are that the canals will not be open until considerably later than usual, thus affecting deliveries to Canadian points. Along the Atlantic seaboard retail buying has been much more active than usual for this season of the year. Many concerns have placed orders for their total season's needs, trusting to the companies to get it forward as fast as possible.

BITUMINOUS.

The seaboard bituminous trade is at present very dull, consumers apparently not caring to take coal. Various causes are assigned for this dullness—the abundant water power available for those manufacturing concerns using both water and steam power, the depression in industrial activity, etc.—the point being that consumers seem to think that they can get all the coal they want when they want it later in the season. As a result, supplies are accumulating at all the tidewater shipping ports, and prices are weak. Ordinary grades of Clearfield are reported sold as low as $2.40@$2.50, f. o. b., New York harbor shipping ports. The large stocks at the loading ports cause the main line roads to hunt up actively shippers delinquent in unloading, and those who do not unload promptly find their car supply at the mines cut off.

The most discussed topic is still the combination of vessel owners and agents in the coastwise trade. The loading and discharging clause, which apparently was aimed chiefly at the loading ports on Chesapeake Bay is accepted there more generally than anywhere else. This may be accounted for by the fact that coal from those ports being generally loaded in large vessels, goes to those few ports where quick discharge can be given. In the far East trade is quiet. First orders on new contracts are closed up pretty well by shippers. At Long Island sound ports demand is light, consumers taking nothing like their usual monthly quotas. At New York harbor points trade is slow, and the large supply of coal at the shipping ports is forcing down prices here. The all-rail trade is in comparatively good condition, and is taking about the same tonnage as for some weeks, though all-rail shipments to New England are on the increase.

Transportation from mines to tidewater is excellent, coal running through from the mines

to New York harbor shipping ports in four or five days. Car supply is up to all demands, but is often restricted to individual shippers on account of coal standing at tidewater. In the coastwise vessel market there is a slight scarcity of vessels, but rates are unchanged. We continue to quote from Philadelphia as follows: Providence, New Bedford and Long Island sound, 70c.; Boston, Salem, Portland and Portsmouth, 90c. for large craft and $1 for small; Bath, 95c.; Lynn, Newburyport, Gardiner, Bangor and Gloucester, $1; Saco, $1.10. Rates from New York harbor to ports beyond Cape Cod are 70@75c.

Birmingham. April 25.

(*From Our Special Correspondent.*)

The coal production in Alabama is heavy. There is a good demand for the product, though sales agents for some of the larger producers announce that the prospects are not as bright as they might be, and some fears are expressed that there will be slack conditions. About 20,000 tons of coal are being shipped monthly down the Mississippi river to the Mississippi and Louisiana markets. The Southern railway has given up the management of the barge line on the river between Greenville, Miss., and New Orleans, and the Monongahela River Consolidated Coal & Coke Co. (Pittsburg Coal Co.) is now in charge. The latter company owns and operates the mines at Corona, in Walker county, and the greater portion of the production at this place is shipped down the river. The shipments of coal from this State to Mexico continue brisk, and it is understood that contracts about to expire are being renewed. This coal is shipped from mines at Stout's mountain and from Blocton, the coal from these two places being firm enough to stand the hauling and triple handling necessary.

The North Alabama railroad (Cane Creek branch of the Louisville & Nashville Railroad) is about finished, and several new mines in the western part of Jefferson county are preparing to commence shipment. The Pratt Coal Co. has been shipping coal from several mines along this railroad for some time, and before another month expects to have at least three new mines shipping coals.

There is no labor trouble to amount to anything on among the coal mines in the State. Effective May 1, the United Mine Workers of America will be in charge of the work at the Virginia City mines, in Jefferson county, belonging to the Alabama Steel & Wire Co. A strike has been on at these mines for more than a year.

Chicago. April 25.

(*From Our Special Correspondent.*)

Heavy business in anthracite, and fair to light business in bituminous, are still the chief features of the local wholesale coal market. The usual accumulation of orders for anthracite is occurring for the latter part of the month, and dealers are looking anxiously for reports indicating the opening of navigation. Dock stocks are so low that in some cases orders are being reserved for delivery next month, at the April prices. The all-rail business is larger than is usual for the time of the year, but deliveries are delayed and general economic considerations demand the chief supply by boat. Reports from the Straits in the last two or three days lead to the belief that cargoes may be received in Chicago and Milwaukee by May 1. The trade is greatly encouraged by the statement of the city officials that the tunnels in the river, which have barred boats drawing more than 17 ft. from passing to the coal docks, are to be lowered as soon as possible. These tunnels have discriminated greatly against the coal trade of Chicago. Indications are that, as soon as navigation has opened, there will be a large and continuing demand for anthracite early in the season, following the example of last year.

Dealers in bituminous say there is little reluctance on the part of users of large quantities of coal to make contracts this spring, contrary to the experience of a year ago. The natural demand, however, is light compared with the capacity of the mines and the railroads. Of eastern coals Hocking probably is the most active, at $2.90@$3.10, as last week. Smokeless brings $2.70@$3.30 and is over-plentiful, though in fair demand. Youghiogheny also has a large supply for the market; it brings in the neighborhood of $3. West Virginia shares in the general weakness at $3.10@$3.25 for run-of-mine and $3.25@$3.50 for lump. Indiana and Illinois continue to supply the greater part of the market at $1.80@$2.50 for lump, $1.60 @$2 for run-of-mine and $1.40@$1.50 for screenings. The cheaper grades are the most active. Smithing is coming into good demand at $3.75@$4 per ton.

Cleveland. April 26.

(*From Our Special Correspondent.*)

The coal situation in this territory has not changed. The market still has an over-supply of coal. This arises from the fact that the shipments to the lakes to take care of the lake trade are not being taken by the boats as freely as was expected, and consequently this material is being thrown upon the market. The prices have been cut down in accordance. Some few of the lake dock machines are being started to load coal into the boats, but the small prospect of these boats getting started up the lakes soon naturally limits the number of cargoes taken. The price of coal has been held about as it was a week ago, for the steam product. The prices are: For Pittsburg steam coal, $1.05, at mine, or $2 Cleveland; and for Ohio coal $1.05, at mine, or $1.75 Cleveland. The demand for slack has improved slightly, but the prices have not stiffened, and the market is represented by a price of 50@60c. at mine. The demand for coal in the upper lake region is still heavy and the market is firm in that respect. The domestic coal situation is quite easy, on account of the better weather conditions.

The coke situation is a little better. Old orders are being caught up with by the heavier movement, and new orders are getting good dispatch. The railroad situation is much easier than it has been at any time for the past four or five months. Prices hold steady at $2.25@ $2.40 for 72-hour foundry coke, and $1.50@ $1.60 for furnace coke.

Pittsburg. April 26.

(*From Our Special Correspondent.*)

Coal.—Lake shippers are disappointed over the refusal of the Western Pennsylvania & Eastern Ohio Coal Traffic Association to make a reduction in the rates to the lake ports. A meeting of the association was held here on Friday, and it was believed the request of the operators would be granted; but after considering the question and hearing the arguments, it was decided to reaffirm the former action and allow the rates to remain the same as last season. Shipments to the lakes began yesterday and to-day shipments by river are being made, the rains of the past two days having made the rivers navigable again. All the mines, both river and rail, are in full operation. Railroad cars at present are up to requirements. It is difficult to quote prices, but $1.10 for run-of-mine seems to be the prevailing price with a 10c. differential for ¾-in. and 20c. for 1¼-in. screened coal. It is believed that annual contracts are being made at a lower figure.

Connellsville Coke.—Production and shipments show but little change, but prices are slightly lower. Furnace coke sold during the week at $1.55@1.65 and foundry is quoted at $2.15@$2.25. The production for the week was 227,451 tons, a gain of about 2,000 tons. The shipments aggregated 10,568 cars distributed as follows: To Pittsburg and river points, 4,029 cars; to points west of Pittsburg, 5,024 cars; to points east of Everson, 1,515 cars.

San Francisco. April 21.

(*From Our Special Correspondent.*)

There is no special change to note in the local coal market. Prices remain steady. The consumption of fuel oil continues large.

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, $8; Richmond, $7.50; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coss Bay, $5.50; white ash, $5.25. For Rocky Mountain coals, ex-car, to dealers, prices are $14 for Colorado anthracite, $11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is nominal at $14 for Pennsylvania anthracite and $13 for Cumberland. Foreign coal in cargo lots is quoted at $13 for Welsh anthracite, $8.50 for cannel and $7.50 for Wallsend and Brymbo.

Foreign Coal Trade. April 27.

Exports of fuel from Great Britain for the three months ending March 31 were as follows, in long tons:

	1903.	1904.	Changes.
Coal	10,332,239	10,506,869	I. 174,630
Coke	158,820	177,396	I. 18,576
Briquettes	172,995	323,357	I. 150,362
Total	10,664,054	11,007,622	I. 343,568

In addition to these exports, there were 3,951,082 tons of coal sent abroad for the use of steamships engaged in foreign trade, against 3,839,463 tons in the corresponding period of 1903, an increase of 111,619 tons this year.

Messrs. Hull, Blyth & Co., of London and Cardiff, report, under date of April 16, that there is a slightly easier tone in the market for most grades of coal, owing to holders realizing their profit, but this will doubtless be temporary, as further large orders are expected. Prices are: Best Welsh steam coal, $4.50; seconds, $4.14; thirds, $4.08; dry, $3.72; best Monmouthshire, $3.78; seconds, $3.54; best small steam coal, $1.98; seconds, $1.68; other sorts, $1.50.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

Freights to the Mediterranean show a decided improvement, but the market otherwise remains unaltered. Some rates quoted from Cardiff are: Marseilles, $1.40; Genoa, $1.41; Naples, $1.32; Las Palmas, $1.44; St. Vincent, $1.56; Rio, $2.10; Santos, $2.46; Buenos Aires, $1.80.

IRON TRADE REVIEW.

New York, April 27.

The iron and steel trades are not showing any advance this week. In the primary markets pig iron has been rather dull, with some shading in prices on foundry grades. Leading interests seem to be supplied for the first half of the year, and do not feel sufficiently confident as to the future to place anything much beyond June delivery. There is a report that the Steel Corporation will purchase 15,000 or 20,000 tons of bessemer pig from the outside furnaces in the Mahoning and Shenango valleys, but nothing official has been given out. Should this be so, the object will be, doubtless, to stiffen the market somewhat, if possible.

In finished material matters are a little better in some lines, particularly structural material, pipes and tubes. There is also a very considerable demand for tin-plates. Bars are very much quieter than they have been, and current demand appears to be supplied for the present.

The lake ore question will not be finally settled until another meeting has been held, which is appointed for May 5. It is generally believed, however, that the independent ore producers will carry their point and that a reduction will be made of $1 a ton on hard bessemer as a basis. The Steel Corporation, it is said, will accept this rather than to have an open market.

The reported sale of the Clairton steel plant has not been finally settled, but negotiations are still in progress.

British Iron Trade.—Exports of iron and steel, and manufactures thereof, from Great Britain, for the three months ending March 31, are valued by the Board of Trade returns as follows:

	1903.	1904.	Changes.
Iron and steel	£7,533,635	£6,707,140	D. £826,495
Machinery	4,386,514	4,606,269	I. 219,755
New ships	925,751	730,549	D. 195,202
Total	£12,845,900	£12,043,958	D. £801,942

Exports of mining machinery, included above, were valued at £208,602, an increase of £40,116 over 1903. Nearly half these exports—£101,801 —were to South Africa.

The chief items of the iron and steel exports were as follows, in long tons.

	1903.	1904.	Changes.
Pig iron	299,036	191,421	D. 107,615
Bars, rods, etc.	27,611	27,309	D. 302
Sheets and plates	123,331	128,874	I. 5,543
Rails	174,929	134,535	D. 40,394
Tin-plates	74,903	82,050	I. 7,147

Exports of pig iron to the United States were 14,588 tons this year, against 149,631 tons in 1903. Exports of tin-plates to the United States were 15,460 tons, against 14,741 tons last year.

Imports of iron and steel into Great Britain for the three months ending March 31 were valued at £1,961,680, against £2,064,638 in the corresponding period of 1903; a decrease of £102,958. The chief items of imports this year were 29,112 tons pig iron; 32,220 tons wrought iron; 131,579 tons steel ingots, billets and blooms; 22,730 tons structural steel.

Imports of iron ore into Great Britain for the three months were 1,384,957 tons, against 1,654,858 tons last year; a decrease of 269,901 tons. Of the imports this year, 1,059,771 tons were from Spain, against 1,347,580 tons last year.

Birmingham. April 25.

(From Our Special Correspondent.)

Southern pig iron manufacturers are still receiving a steady inquiry for their product, and, while some of the companies are out of the market altogether, there is considerable iron being sold for delivery after June 1. One of the larger companies, reported out of the market, announces that probably by May 1 it may be ready to accept business again, the anticipation being that by then the prices may have settled down, and business for the last part of the year, into the fourth quarter, if desired, can be handled at profitable figures. The advance of 25c., noted last week, appears to hold, and No. 2 foundry is selling as high as $10.50 per ton, though there is some selling between $10 and $10.50.

The production in the southern territory is quite healthy. The Sloss-Sheffield Steel & Iron Co. announces that its six furnaces in operation are producing something like 200 tons each a day. The Republic Iron & Steel Co.'s three furnaces at Thomas are working to their full capacity now.

New furnaces under construction in this State, one at Woodward, belonging to the Woodward Iron Co., and the other at Ensley, belonging to the Tennessee Coal, Iron & Railroad Co., are nearing completion.

The following quotations are given: No. 1 foundry, $10.25@$10.50; No. 2 foundry, $10@$10.50; No. 3 foundry, $9.50@$10; No. 4 foundry, $9@$9.50; gray forge, $8.50@$8.75; No. 1 soft, $10.50; No. 2 soft, $10@$10.50.

Cast-iron pipe manufacturers in this section report their business as still very brisk. In steel the conditions are quite favorable. The big steel works at Ensley are doing better now than at any time since it resumed operations. The mills of the Alabama Steel & Wire Co., at Ensley, are running on full time. The steel plow works of the Empire Plow Co., located also at Ensley, appear to be enjoying prosperity.

Foundries and machine shops in the Birmingham district report no change in conditions. The Birmingham Iron & Steel Co. has completed the big iron statue, "Vulcan," which will be placed by the Birmingham district in the St. Louis exposition, and the same has been shipped to the Fair city. The plant of the Birmingham Iron & Steel Co. (foundry and machine-shop) will be enlarged shortly, a steel furnace to be added.

The committee of experts appointed by the Tennessee Coal, Iron & Railroad Co., the Republic Iron & Steel Co., and the Sloss-Sheffield Steel & Iron Co. to investigate values of ore and coal properties looking to a consolidation of the three companies, announce that they see the end of their work and expect to be able to make a report inside of four or five weeks. The original idea of consolidation will not be carried out, it is believed, there being disagreement as to the basis.

Chicago. April 25.

(From Our Special Correspondent.)

Firmness continues to characterize the local market for pig iron. There are no signs of a notable advance or decline in the volume of sales or in prices. The bulk of the business continues to be done in southern at $10@$10.25, Birmingham, or $13.85@$14.10, Chicago, for No. 2. Northern is in steady demand at $14.25@$14.50 and is finding increasing favor. Most of the business has been in small lots, nothing over 1,000 tons being recorded, or at least made public. Though selling agents frankly confess themselves somewhat disappointed at the reluctance of users of iron to buy more freely, there is a feeling of confidence everywhere that the market is on a firm basis, and is bound to go forward rather than backward, though ever so slowly. Buyers commonly express the same belief, but many continue their old argument: "We'll wait just a little longer, for the price may go down."

Coke is still weak, any quantity being obtainable at $4.80@$4.90 for Connellsville 72-hour. There are no signs that the surplus coke on track, and moving at forced prices to forestall demurrage charges, will speedily be cleared away.

Cleveland. April 26.

(From Our Special Correspondent.)

Iron Ore.—The iron ore situation is not radically different this week. There is still the meeting of the Ore Association on May 3, to take into consideration and the possibility of a failure to reach any settlement as to the price of ore and the possible output. The vessel-men have lost some hope for their rates, when they contemplate the price action, as they hardly see the possibility of any very favorable rates for the carriage of that material at proposed prices for ore. Nothing has been done in that direction, however, as the rates for carrying ore have hardly been discussed.

Pig Iron.—The buying during the past week, in the foundry trade, has been in small lots, but of a good nature. It has seemingly been the covering of current needs. Consumers do not show much anxiety to cover for the second half, and the furnaces are backward about taking contracts through that period, not having yet agreed upon the price. The possible settlement of the ore difficulty is simplifying that situation. The market is nevertheless in a complex condition, which dictates caution. In the bessemer trade there is about the same state of affairs. The market as a whole has no definite turn to it just now, and the possible demand for pig iron is by no means fully outlined. The trade conditions are such that consumers do not want to cover their future needs, and they are holding back. The price is nominally $13.50 in the Valley. The inquiries for basic are not so heavy as they have been. The situation is not reassuring, but the price holds steady at $13.25@$13.50 in the Valleys.

Finished Material.—The market has been steady, but not very strong. The week opened with a little spurt in buying, but with nothing of a permanent nature indicated in the trading. Bars are the strong feature, with some new contracts and good specifications against old contracts. The price holds steady. Hoops have advanced $2 a ton on less than car-lots, with buying heavy in anticipation of further advances. Sheets are stronger, with the market indicating that the spring business is beginning to show itself. Prices are still based on 2.50c. for No. 27 black sheets out of stock. The demand for structural shapes has been fair, the market holding its own at the old prices of 1.60c., Pittsburg. The plate trade is in about the same condition.

Old Material.—The trade inclines to be a little dull. The market as a whole is easy.

New York. April 27.

Pig Iron.—Some sales for delivery into the third quarter are reported. Quotations have been shaded. We quote at tidewater as follows: No. 1 X foundry, $15.70; No. 2 X foundry, $15.20; No. 2 plain can be had for 50c. less; while gray forge is selling around $14. For Southern irons on dock quotations are: No. 1 foundry, $14.25@14.50; No. 2 foundry, $13.75@$14; No. 3 foundry, $13.25@$13.50. No. 1 soft can be had at about $14.25, and No. 2 soft at $13.75.

Bar Iron and Steel.—The trade is in satisfactory shape. Refined bars are quoted at 1.495c., in large lots, with steel at the same figures. Common iron bars can be had for 1.35c.

Plates.—The market is still dull, with orders confined to small lots. Prices are firm. Sheared plates are quoted as follows: Tank, 1¼-in. and heavier, 1.75@1.85c.; flange, 1.85@2c.; marine, 2@2.10c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills. Light rails are quoted f. o. b. eastern Pennsylvania mills as follows: 12-lb., $27; 20-lb., 25-lb., 30-lb., and 35-lb., $25; 40-lb. and 45-lb., $24.

Structural Material.—If no serious labor troubles develop in the building trades May 1, demand should increase. Large lots at tidewater are still quoted at 1.75@2c. for beams, angles and channels.

Philadelphia. April 27.

(From Our Special Correspondent.)

Pig Iron.—The disturbing factor which is interfering with the sale of pig iron at the recent improvement is the continued offerings of southern iron on terms favorable to buyers. Apart from this, the market is dull enough. The consumers throughout this territory are rather conservative, and having fairly provided themselves with iron, are now awaiting the effects of reviving spring trade. There are no good irons being offered by the furnace interests, although all makers are willing to book orders for early summer delivery. A little disappointment is expressed in the different offices over the unexpected sag in demand. The larger buyers are justifying their inaction in the expectation of further competition from southern sources, and it must be said they have some reason for their action. Inquiries prevail for 1,000-ton lots of forge, basic, and bessemer, but our office people do not expect much to come from them. Quotations may be given at $15.50@$16 for No. 1; $15 for No. 2; $14.75 for No. 2 plain; for southern No. 2 the prevailing asking price is $14.50, though this figure was shaded in two or three instances. Standard forge is bringing $14, and ordinary $13.25.

Billets.—Orders have been taken for small lots at $25.50 and business at $24.50 has been refused for large lots.

Merchant Bar.—The merchant bar market continues active and prices are strong, especially for early delivery. A few of the mill managements have within a few days quietly made offers at concessions for late deliveries. Quotations still continue at 1.48½ to 1.55c.

Structural Material.—Structural material is without special feature. The American Bridge Co.'s Pencoyd plant resumed operations on Monday, employing 1,000 hands working on orders for Baltimore and for the Japanese government.

Old Rails.—Handlers of old rails are exhibiting considerable activity in negotiating for supplies. The quoted price is $18.50.

Scrap.—The scrap dealers who handle large lots have recently secured control of several large lots of scrap, including choice railroad, heavy steel and machinery scrap. There is considerable diversity in prices at the various yards; No. 2 forge scrap is selling at $13; wrought turnings, $10.50; wrought iron pipe, $13; No. 1 heavy steel scrap is offered at $15.50 per ton.

Pittsburg. April 26.

(From Our Special Correspondent.)

The pig iron market is decidedly weaker, and according to reported sales within the past few days, prices have declined in all grades. Some furnaces are maintaining the quotations of a week ago, as it is confidently believed the United States Steel Corporation is about to make another purchase of bessemer iron. The effect of this it is expected will stimulate the market. An important meeting of the heads of the different departments of the Corporation was held here on Friday and Saturday. The greatest secrecy was observed, and it was not known until yesterday that the meeting had been held. The pig iron committee heard reports from underlying concerns as to their re-

quirements for iron, and while no official information was given out, there were reports that the Corporation undoubtedly would buy from 10,000 to 15,000 tons of bessemer iron for its Cleveland, Lorain and Sharon plants. President W. E. Corey left for New York yesterday and other officers declined to talk on the subject. One of them said that if any iron is needed the tonnage would be decided upon and the order placed from New York some time this week. The officers of the Corporation strictly observe the policy to give out no information of this kind and it is not until the contract is placed that such matters are made public. It is known that the Bessemer Pig Iron Association, W. P. Snyder & Co. and the Cleveland Furnace Co. have bids in and it is said the price at which the iron is offered is not less than $13 a ton at the furnace. The deal for the transfer of the Clairton Steel Co.'s properties to the Corporation was not closed last week as had been expected. President Corey held a long consultation with the receivers and officers of the Crucible Steel Co. of America on Saturday, and it is now reported that the final terms will be more favorable than the original offer. One of the receivers said to-day that while the deal had not been closed it undoubtedly would be in a short time. No official statement will be made as to the terms until the transaction is concluded. Among the reports in circulation is one that the Corporation will get the property at about $5,000,000 less than its actual value. Two of the three blast furnaces at Clairton are in operation and the third may be blown in early next week. This, however, will not increase the pig iron capacity of the Corporation, as it is asserted the iron will be needed in the Clairton steel plant. The steel works are in full operation and among the orders on hand is one calling for 500 tons of open-hearth billets from the Pittsburg Steel Co. This contract runs to July 1. It is estimated that the Clairton plant will break its record this month by turning out 30,000 tons of billets.

In some of the finished lines, particularly structural material, pipe and tin-plate, there is increased activity. The American Sheet & Tin Plate Co. has received more orders and inquiries during the past week than at any time in its history. All of its tin-plate plants are in full operation except the Laughlin at Martins Ferry and the Labelle at Wheeling, where the catchers are on strike, and the Beaver plant at Lisbon, O., a non-union plant, which has been idle for about a year. Most of its sheet mills are running. Heavy stocks of tin-plate have been accumulated and it is believed that the company intends to close its union plants at an early date and advance prices. Under the revised scale, an increase in prices will advance wages, but with a three or four months' supply in stock the union works may be shut down without any inconvenience. It is reported that the Standard Oil Co. may soon place an order for about 100,000 tons of pipe for this year's delivery and that the bulk of the order will go to the Steel Corporation.

Strikes are on at five tin-plate plants against the 18% reduction authorized by the Amalgamated Association of Iron, Steel & Tin Workers. They are at the Washington and Waynesburg works of the W. H. Griffiths interests, the Steubenville plant of the Pope Tin Plate Co. and the Labelle and Laughlin plants of the Corporation. The officers of the association expect to effect a settlement this week. There is growing dissatisfaction among the sheet and tin-plate workers over the action of the association's officers and a movement has been started to withdraw and form an organization composed exclusively of plate, sheet and tin-plate workers.

Pig Iron.—The market is quiet this week and prices are lower according to a statement of a leading furnace interest. Announcement was made to-day of sales of 10,000 tons of foundry and forge iron at from 50 to 75c. less than prices quoted a week ago for foundry No. 2 and a slight advance for gray forge. No. 2 was quoted at $13.35@$13.60 and gray forge at $13.20@$13.50, Pittsburg. Other furnaces quote No. 2 at $14@$14.25 and gray forge at $13@$13.25, Pittsburg. For April delivery, bessemer is firm at $13.50, Valley; for May $13.25 and for May, June and July $13, Valley, can be done. A few small lots of bessemer were sold during the week at $13.50, Valley.

Steel.—The market is quiet and prices of billets are being fairly maintained, but it is reported that some shading was done on a few small orders. The total sales for the week, however, it is believed will not exceed 2,000 tons. Steel bars are firm at 1.35c. and tank plate is still quoted at 1.60c. The tonnage is fairly good.

Sheets.—The sheet market is good as to tonnage, but prices are lower. Sales of No. 28 gauge black sheets are reported to have been made as low as 2.20c. The leading interest continues to quote 2.30c. for black and 3.30c. for galvanized.

Ferro-manganese.—There has been a falling off in demand and domestic 80% has declined to $42@$42.50 per ton.

Cartagena, Spain. April 9.

(*Special Report of Barrington & Holt.*)

Iron and Manganiferous Ores.—Shipments reported include one cargo, 5,150 tons Colorado ore, and one cargo, 4,750 tons dry ore, to Rotterdam; one cargo, 2,701 tons dry ore, to Middlesbrough. The port has been fairly busy during the week, a good deal of ore having been shipped, while several steamers are due for prompt shipments. There is some inquiry for forward delivery, as well as for near shipment, for both iron and manganiferous ores.

Current quotations for iron ore are: Ordinary 50% ore, 6s. 6d.@6s. 9d.; special low phosphorous, 7s.@7s. 6d.; specular ore, 58% iron, 9s.; magnetic ore, 60% 11s. 3d. for lumps and 9s. 3d. for smalls. Manganiferous ores range from 14s. 3d. for 20% iron and 20% manganese down to 9s. 6d. for 35% iron and 12% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. 3d. per ton.

CHEMICALS AND MINERALS.

(See also Prices—Current on page 710.)

NEW YORK, April 27.

Regular consumers are drawing moderate quantities on their season contracts, while an occasional transient buyer will be benefited by a concession made in price, in the hope of securing him as a regular customer.

The expected increase of $8,000,000 in the preferred capital of the Virginia-Carolina Chemical Co., of which $6,000,000 will be issued soon at par in the proportion of about 15% of shareholders' credit, has recently been underwritten by Blair & Co., of New York, who are acting for a syndicate. It is understood that a commission of 2% will be paid the underwriters, and any of the new stock not taken by the shareholders will be subscribed to by Blair & Co., as the head of the syndicate. The $2,000,000 extra preferred stock to be authorized, will be issued at yearly intervals at rate of $400,000 or more, as may be voted by the shareholders. The first issue of new preferred stock will be used to convert the present floating indebtedness. The preferred shareholders receive 8% in dividends annually, which on the increased capitalization will eventually amount to $1,600,000, or $640,000 more than is now being paid. It is contended that the company's sales are steadily increasing, and that even in normal times the dividend on the additional preferred stock will not exceed the expense heretofore met by borrowing money at current rates, and the necessity of keeping large balances in bank and the acceptance at times of loans in advance of actual requirements.

Exports of chemicals from New York for the first three months of this year included 1,028,183 lb. bicarb. soda, principally to the Argentine Republic, West Indies and Great Britain, and 554,471 lb. caustic soda, chiefly to Mexico and the West Indies. Zinc oxide to the amount of 16,931 bbl. was exported, principally to Great Britain and France.

Cyanide.—Occasionally small parcels arrive from Great Britain, while exports are in like quantity, principally to Mexico. Importers still quote 19@20c. per lb., f. o. b. New York.

Bleaching Powder.—Apparently British makers are realizing a curtailed trade in America, for in March exports to this country were less than two-thirds of their total shipments, whereas a year ago they were over three-quarters. For the three months ending March 31 the United States received 15,884,400 lb. British bleach, which is 8,906,800 lb., or about 36% less than the corresponding period in 1903. Momentarily prime British bleach sells in New York at $1.25 per 100 lb., the same as high-test American, while Continental brings $1.20.

Copper Sulphate.—Transient buyers in small quantity pay from $5.20@$5.25 per 100 lb., while makers quote for forward shipment, $5@$5.05. Exports from Great Britain to markets visited by Americans are increasing, and in March amounted to 17,975 tons, making 34,913 tons since January.

Acids.—Continued strength in nitrate of soda has stiffened the nitric acid trade. Sulphuric acid shows better inquiry. Great Britain exported 1,093,568 lb. sulphuric acid, and imported 451,136 lb. in March.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l.	$5.10@$5.50
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@14.50
Muriatic, 22°	1.75	Sulphuric, 60°	1.05
Nitric, 36°	4.50	bulk, ton	18.00@20.00
Nitric, 38°	4.75	Sulphuric, 66°	1.20
Nitric, 40°	5.00	bulk, ton	21.00@23.00
Nitric, 42°	5.50		

Brimstone.—Freer arrivals from Sicily have eased the spot market somewhat, and sales are reported at $22.75@23 per ton. Shipments of best unmixed seconds are quoted $21.75@$22, while thirds are nominally 75c. less.

Pyrites.—Business continues of an uninteresting nature, and prices are unchanged. In March Great Britain imported 62,670 tons pyrites, making, since January, 203,494 tons, equivalent to 95,642 tons sulphur, which is an improvement over last year.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 9c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@11.5c. per unit for lump, and 9.5@10c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—From all appearances this market will show high prices for some time to come, being encouraged by the peculiarly adjusted statistical position, and an increasing consumption here. Spot and nearby supplies are offered at $2.25@$2.30 per 100 lb., while futures are held at $2.125@$2.15, according to position.

Sulphate of Ammonia.—Orders are not plentiful, as the fertilizer buying season is passed, though occasionally a consumer will come forward to take an odd lot. Good gas liquor ammonia is quoted at $3.125@$3.15 per 100 lb., according to delivery.

Phosphates.—Rarely has the hard rock industry of Florida been in such a favorable statistical position as it is to-day. Stocks are nearly 45,000 tons less than January 1, and of the quantity held only about half a month's shipments is unsold. Coupled with this the production has been curtailed, and it seems likely that this year's total will be less than the exports. Equally interesting is the fact that two large firms control the bulk of the visible supply. Incidentally the f. o. b. price of hard rock has been advanced, and it needs no magnifying glass to discover that miners have a sort of philanthropic feeling for the European superphosphate manufacturer whose prices can only be improved by higher cost of raw materials. On the other hand the export miner has begun to realize that it hardly pays to sell on long-time contracts at current low prices, and that the sooner a change is made the better for all concerned.

Abroad the Tunis phosphate miners are largely increasing their shipments, particularly to France and Italy, having transported 108,799 metric tons in the first quarter this year, as against only 60,840 tons in 1903.

Ocean freights are firm, though charters are few, as vessels are scarce.

	Shipping ports		
	Florida.	So. Carolina.	Africa.
Baltic	$3.46@$3.74	$2.26	$2.18
Continental	2.76@ 3.00	....	1.80@ 2.22
Mediterranean	3.12@ 3.42	....	1.80
United Kingdom	2.64@ 3.12	2.56@ 2.64	1.86@ 2.04

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla. hard rock, 77@80%....	$7.00@$7.25	$10.07@11.63
land pebble, 68@73%..	3.75@ 4.00	7.35@ 8.05
†Tenn. 78@80%.....	4.00@ 4.25	9.88@ 10.66
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock.....	3.25@ 3.50	.....
river rock, 55@60%.	3.00@ 3.25	5.75@ 6.56
Algerian 63@70%	.....	6.82@ 7.32
58@63%	.....	6.05@ 6.50
53@58%	.....	4.95@ 5.09
Tunis (Gafsa)	.....	5.75@ 6.50
Christmas Isle, 80@85%.....	.....	11.75@ 12.54
Ocean Isle, 82@88%.....	.....	12.54@ 12.98
Somme, Fr., 70@75%.....	.....	10.63@ 11.02
Bordeaux, Fr., 60@65%.....	.....	7.60@ 7.72
55@60%.....	.....	6.44@ 6.55
Liege, Bel., 60@65%.....	.....	7.00@ 7.10

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

Liverpool. April 13.

(*Special Report of Joseph P. Brunner & Co.*)

The market for heavy chemicals is steady, without any special feature to report.

Exports of bleaching materials and sodas for March, as per Board of Trade returns were: Bleaching materials to United States, 40,765 cwts.; other countries, 21,847 cwts.; total, 62,612 cwts. Soda ash, 135,350 cwts.; bicarb. soda, 29,772 cwts.; caustic soda, 152,-144 cwts.; soda crystals, 15,549 cwts.; saltcake, 63,317 cwts.; other sorts, 26,953 cwts.; total, 423,085 cwts. Compared with the corresponding month of last year, there is a decrease of 40% in total exports of bleaching materials, the shipments to America being little more than half what they were, while to other quarters the decrease is only slight. Soda shipments are more satisfactory, the total being over 17% heavier than last year, principally in soda ash, bicarbonate and caustic soda.

Soda ash is well controlled by makers. For tierces, nearest values are about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s. @£6 per ton net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s.; bags, 5s. per ton under price for tierces. Soda crystals are firm at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags, with special terms for a few favored markets. Caustic soda is in fair request, and prices are firm, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for export to the Continent and a few other export quarters. Bleaching powder is quiet at £4 5s.@£4 10s. per ton, net cash, for hardwood packages, as to market. Chlorate of potash is in limited demand, and quotations are nominal at about 2⅜d.@2½d. per lb. net cash, for English make. Bicarb. soda is moving into consumption at £6 15s. per ton, less 2½% for the finest quality in 1 cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets. Sulphate of ammonia is quiet at £12 13s. 9d.@£12 15s. per ton, less 2½% for good gray 24@25% in double bags f. o. b. here. Nitrate of soda is only in very moderate supply on spot and is held for £10 7s. 6d.@£10 12s. 6d. per ton, less 2½d. for double bags f. o. b. here, as to quantity and quality.

METAL MARKET.

New York, April 27.

Gold and Silver Exports and Imports,

At all United States Ports in March and Year.

Metal	March.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports.	$1,042,598	$3,062,747	$2,634,919	$4,386,928
Imports.	4,567,728	8,855,760	8,396,035	22,115,640
Excess	I. $3,525,130	I. $5,793,013	I. $5,761,116	I. $17,728,712
Silver:				
Exports.	3,664,660	4,110,053	11,109,045	12,675,249
Imports.	1,478,771	2,108,386	4,660,334	6,824,403
Excess	E. $2,185,889	E. $2,001,667	E. $6,448,711	E. $5,850,84

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending April 23 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$1,542,354	$26,084	$698,175	$50,227
1904.....	8,306,449	1,607,438	14,277,952	260,959
1903.....	1,317,450	2,327,448	5,787,204	387,534
1902.....	10,437,751	1,061,880	10,456,412	439,960

The outward movement of gold has been considerable this week, a total of $7,100,000 having been taken for shipment from New York by the mid-week steamers. It is expected that considerably more will be taken for the Saturday sailings. While no public announcement is made of the fact, there is little doubt that these large shipments are chiefly made in order to finance the Panama Canal payments. The gold shipped all went to France. The amount, however, is moderate in comparison with that received from Japan and Australia during the year, to say nothing of our own production.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending April 23, gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts....	$900,625,100	$1,046,390,300
Deposits	887,603,300	1,109,374,400
Circulation	43,538,000	35,725,000
Specie	164,275,100	236,157,500
Legal tenders.....	68,611,200	75,389,800
Total reserve	$232,886,300	$311,547,300
Legal requirements	221,900,825	277,343,600
Balance surplus.....	$10,985,475	$34,203,200

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'd—	$164,275,100	.....	$236,157,500	.....
England—	174,680,085	.....	172,703,325	.....
France—	500,465,710	$220,948,165	481,891,300	$223,407,595
Germany—	166,680,000	58,565,000	166,710,000	58,575,000
Spain—	72,395,000	101,035,000	73,320,000	98,740,000
Netherlands—	19,678,500	32,716,000	27,221,500	32,686,000
Belgium—	15,513,335	7,756,665	15,196,665	7,598,335
Italy—	88,745,000	11,375,000	110,600,000	19,086,000
Russia—	382,170,000	41,815,000	434,190,000	41,825,000
Austria—	229,355,000	64,875,000	236,840,000	64,725,000

The returns of the Associated Banks of New York are of date of April 23, and the others April 20, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Silver has shown more strength the past week, owing to some speculative inquiry, and the fact that sellers are not pressing. The market has been somewhat erratic, but closes steady at quoted figures.

The United States Assay Office in New York reports receipts of 73,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to April 14 are reported by Messrs. Pixley & Abell's circular as follows:

	1903.	1904.	Changes.
India	£2,331,500	£3,720,289	I. £1,388,789
China	121,775	71,000	D. 50,775
Straits	148,391	58,103	D. 90,288
Total	£2,601,666	£3,849,392	I. £1,247,726

Receipts for the week were £208,000 in bar silver from New York, £6,000 from Australia, and £3,000 from Chile; total £217,000. Shipments were £280,700 in bar silver to Bombay, £5,000 to Calcutta, and £2,556 to Port Said: total, £282,250.

Indian exchange was steady, and there was a good demand for Council bills in London, all those offered being taken at an average of 16.03d. per rupee. Buying of silver for Indian account shows considerable improvement.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	$0.43½	$0.46½
Peruvian soles and Chinese pesos.....	.39½	.43
Victoria sovereigns.....	4.85⅓	4.87
Twenty francs.....	3.86	3.88
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

April	Silver— New York, Cts.	Silver— London, Pence.	Copper— Lake, Cts. per lb.	Copper— Electrolytic, Cts. per lb.	Copper— London, £ per ton.	Copper— Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter— N. Y., Cts. per lb.	Spelter— St. Louis, Cts. per lb.
21	53⅞	24 1/16	13 @13¼	12⅞ @13	57⅞	28⅛	@4.45 4 50	5.22½	5.05
22	54⅛	25⅛	13 @13¼	12⅞ @13	58	28⅛	4.45 @4.50	5.22½	5.05
23	55¼	25½	13 @13¼	12⅞ @13	....	28⅛	4.45 @4.50	5.22½	5.05
25	54⅛	25	13 @13¼	12⅞ @13	58	28⅛	4.45 @4.50	5.22½	5.05
26	54⅛	24 1/16	13 @13⅛	12⅞ @13	58¼	28@ 28⅛	4.45 @4.50	5.22½	5.05
27	55	25⅜	13 @13¼	12⅞ @13	58½	28@ 28⅛	4.45 @4 50	5.22½	5.05

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars: the price of electrolytic cathodes is usually 0.25c. lower than these figures

QUOTATIONS ON STERLING EXCHANGE.

April	21.....	4.8745	April	25.....	4.8725
"	22.....	4.8725	"	26.....	4.8720
"	23.....	4.8725	"	27.....	4.87⅛

The offices of the United Metals Selling Company were removed, on April 23, from No. 11 Broadway to No. 42 Broadway, New York.

Copper ruled very quiet indeed until to-day when a large business developed, owing to renewed demand from Europe, where consumption continues excellent. There is no doubt that, in spite of the heavy exports from this country, there are practically no stocks of refined copper abroad, the material going directly to the works of the manufacturers. Home consumers have not as yet entered the market very freely, but inasmuch as most of them have only covered their nearby requirements, better business for home trade may also be looked for in the near future. The closing quotations are given as 13@13¼ for Lake copper; 12⅞@13 for electrolytic in ingots, cakes and wirebars, 12⅝ @12¾ in cathodes; 12½@12¾ for casting copper.

The market for standard copper in London, which closed last week at £58, opened on Monday at the same figure, and the closing quotations are cabled as £58 7s. 6d.@£58 10s. for spot, £58 2s. 6d.@£58 5s. for three months.

Refined and manufactured sorts we quote: English tough, £62 5s.@£62 10s.; best selected, £62 15s.@£63; strong sheets, £72 15s.@£73; India sheets, £70 15s.@£71; yellow metal, 6⅜d. @6½d.

Our special correspondent at Baltimore reports the exports of copper for the week ending April 26 at 495 tons to Holland.

Imports of copper and copper material into Great Britain, with exports of metal, for the three months ending March 31, are reported as follows, in long tons; the totals showing the approximate contents in fine copper:

	1903.	1904.	Changes.
Copper ores.....	20,160	21,664	I. 1,504
Matte and precipitate.....	17,708	12,528	D. 5,180
Fine copper.....	13,934	24,397	I. 10,463
Total, fine copper.....	24,804	32,827	I. 8,023
Exports	14,158	12,622	D. 1,536
Balance	10,646	20,205	I. 9,559

Of the imports this year, 3 tons of ore, 1,532 tons of matte and 14,354 tons of fine copper were from the United States; against 125 tons of ore, 1,303 tons of matte and 4,559 tons of fine copper last year.

Tin.—In the absence of any speculative demand, the market has ruled very quiet indeed throughout the week, and the business done has been confined to early deliveries. The closing quotations are given as 28@28⅛ for spot, 27⅞@28c. for futures.

The foreign market, which closed last week at £127 10s., opened on Monday at £127 15s., declined on Tuesday to £127, and the closing quotations are cabled on Wednesday as £127 10s.@£127 12s. 6d. for spot, £126 10s.@£126 12s. 6d. for three months.

There is a rumor that the quantities of Banka tin which are being disposed of at the regular sales may be increased in the near future. So far, the report could not be verified.

Imports of tin into Great Britain, with re-exports of imported tin, for the three months ending March 31, are reported as follows, in long tons:

	1903.	1904.	Changes.
Straits	5,007	5,743	I. 736
Australia	1,001	1,071	I. 70
Other countries	653	850	I. 197
Total imports	6,661	7,664	I. 1,003
Re-exports	6,242	5,421	D. 821
Net imports	419	2,243	I. 1,824

In the first quarter of 1903, the re-exports very nearly equalled the imports. Most of the re-exports are tin in transit to the United States.

Lead is quiet, but steady, and nothing of special interest has transpired. The ruling quotations are unchanged at $4.45@$4.50 New York, $4.37½@$4.42½ St. Louis.

The foreign market is somewhat steadier, Spanish lead being quoted at £12 2s. 6d.; English lead, £12 5s.

Imports and exports of lead in Great Britain for the three months ending March 31 are reported as follows, in long tons:

	1903.	1904.	Changes.
United States	9,367	8,214	D. 1,153
Spain	24,218	25,846	I. 1,628
Australia	16,295	16,830	I. 535
Other countries	5,170	4,704	D. 466
Total imports	55,050	55,594	I. 544
Exports	7,304	9,486	I. 2,182
Balance	47,741	46,108	D. 1,638

The lead credited to the United States was chiefly Mexican lead, refined here in bond.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is quiet and demand rather light. Missouri brands can be quoted at 4.40c., while 4.42½c. is named for argentiferous lead.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 9, that the price of silver during the week has been 14 reales per oz. Exchange is 34.91 pesetas to £1. Local quotation for pig lead on wharf is 69.25 reales per quintal, which is equal on current exchange, to £11 10s. per long ton, f. o. b. Cartagena. Shipments were 561,814 kg. soft lead to London; 302,929 kg. soft lead and 50,000 kg. desilverized to Marseilles; also 640 kg. bar silver to Marseilles.

Spelter has ruled quiet, but steady, with the demand nothing out of the ordinary. The ruling quotations are unchanged at 5.05 St. Louis, 5.22½ New York.

The foreign market is firm, good ordinaries being quoted at £22 7s. 6d., specials £22 12s. 6d.

Imports and exports of spelter in Great Britain for the three months ending March 31 are reported as follows, in long tons:

	1903.	1904.	Changes.
Spelter	21,013	22,275	I. 1,262
Manufactured zinc	5,460	5,580	I. 120
Total imports	26,473	27,855	I. 1,382
Exports	2,317	1,820	D. 497
Balance	24,156	26,035	I. 1,879

Imports of zinc ore are not given separately in the reports.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is firm, but rather dull. The latest sales are on a basis of 5.05c. East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 9, that prices have ruled firm, and miners are now sold well ahead. Quotations are 65 fr. per ton for blende, 35% zinc, and 45 fr. for calamins, 30% zinc. Shipments for the week were 160 tons blende to Swansea, and 3,700 tons blende to Antwerp.

Antimony is dull and neglected. We quote Cookson's at 7¾@8c.; Hallett's, 6⅝@6⅞; Hungarian, French, Japanese, U. S., Italian and Chinese, 6¼@6⅜c.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Quotations are nominally $18.50 per ounce, but the tendency is upward, and higher prices are expected.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Quicksilver.—The New York price is $45 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders, and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

Imports of quicksilver into Great Britain for the three months ending March 31 were 1,206,430 lb., against 1,568,886 lb. in the corresponding period of 1903. Re-exports of foreign quicksilver for the three months were 464,599 lb., against 43,160 lb. last year.

Cadmium.—According to Herr Paul Speier, metallic cadmium is in good demand. Metal containing 95.5% cadmium sells at 700 marks per 700 kg., delivered in Berlin or Hamburg.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1. 99% ingots	33@37c.	Ferro-Tungsten (37%)	38c.
No. 2. 90% ingots	31@34c.	Magnesium, pure (N. Y.)	60c.
Rolled Sheets	4c. up	Manganese	$2.75
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum	33@39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	$2.10	Molybdenum (Best)	$2.00
Chromium, pure (N. Y.)	80c.	Phosphorus, foreign	45c.
Copper, red oxide	50c.	Phosphorus, American	70c.
Ferro-Molybde'm (50%)	$1.25	Sodium metal	50c
Ferro-Titanium (10%)	90c.	Tungsten (Best)	88c.
Ferro-Titanium (20@25% N. Y.	55c.		

Variations in price depend chiefly on size of order.

Missouri Ore Market. April 23.

(From Our Special Correspondent.)

The highest price reported paid for zinc ore was $39 per ton, 50c. less than the previous week. Notwithstanding this apparent decline the ores that brought this price were advanced $1 per ton over the last selling price. An effort was begun two weeks ago by a few of the purchasing agents to force the acceptance of a lower market, but no sooner was this begun than other buyers followed and offered for the larger quantity of the ore reduced in price, the former quotation. The effort to lower quotations has, therefore, merely resulted in shifting the mineral from one to another smelter without materially affecting the price. Where ore has been sold at a less price it has been found that it does not maintain an equable standard of quality.

The lead quotation has remained unchanged seven weeks at $58 per ton.

Following are the shipments of zinc and lead from the various camps of the Joplin district for the week:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	2,615,600	560,090	$56,780
Joplin	2,448,860	223,190	50,550
Galena-Empire	982,570	161,460	19,420
Duenweg	859,850	91,850	18,140
Alba-Neck	912,070	4,700	16,550
Aurora	560,000	4,500	9,100
Prosperity	321,420	84,940	8,080
Cartnage	374,490	.....	6,740
Granby	441,000	31,000	6,500
Zincite	194,470	.....	3,500
Badger	179,060	.....	3,050
Carl Junction	109,960	15,220	2,475
Central City	112,870	13,660	1,975
Oronogo	86,110	20,330	1,795
Beef Branch	40,040	58,930	1,640
Mitchell	66,230	6,210	1,440
Spurgeon	109,260	8,530	1,170
Cave Springs	60,110	8,690	1,170
Totals	10,474,100	1,293,300	$210,075
Seventeen weeks	172,814,930	21,550,320	$3,489,995

Zinc value, the week, $173,205; seventeen weeks, $2,886,445. Lead value, the week, $36,870; seventeen weeks, $603,550.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903	1904.	1903.	1904.	1903,	1904.
Jan...	28.33	28.845	4.075	4.347	4.865	4.863
Feb ..	29.43	28.087	4.075	4.375	5.043	4.916
Mar..	30.15	28.317	4.442	4.475	5.349	5.067
April.	29.81	.....	4.567	.....	5.550	....
May .	29.51	.....	4.325	.....	5.639	....
June .	28.34	.....	4.210	.....	5.697	....
July..	27.68	.....	4.075	.....	5.902	....
Aug..	28.29	.....	4.075	.....	5.725	....
Sept..	26.77	.....	4.243	.....	5.686	....
Oct...	25.92	.....	4.375	.....	5.510	....
Nov..	25.42	.....	4.218	.....	5.598	....
Dec...	27.41	.....	4.162	.....	4.731	....
Year	28.09	.....	4.237	.....	5.400	....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February 4.717c.; March, 4.841c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb...	12.778	12.063	12.901	12.245	57.34	56.57
Mar..	14.416	12.299	14.572	12.551	63.85	57.821
April.	14.454	.....	14.642	.....	61.72	.....
May..	14.435	.....	14.618	.....	61.73	.....
June .	13.942	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	56.64	.....
Aug..	12.962	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec. .	11.952	.....	12,084	.....	56.96	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars: prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903		1904.	
	London. Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan..	25.82	55.56	21.98	47.57	26 423	57.055
Feb..	25.41	55.09	22.11	47.89	26.665	57.592
Mar..	25.00	54.23	22.49	48.72	26,164	56,741
April.	24.34	52.72	23.38	50.56	.....	.....
May..	23.71	51.31	24.89	54.11	.....	.....
June .	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Alpha, Nev.	May 9	June 1	$0.05
Champion, Cal.	May 17	.....	.50
Con. Cal. & Va., Nev.	May 20	June 10	.25
Crown Point, Nev.	Apr. 27	May 18	.10
Gould & Curry, Nev.	May 19	June 7	.10
Justice, Nev.	Apr. 22	May 11	.10
Lower Monmouth, Utah	May 26	June 14	.05
Middle Yuba, Cal.	May 24	.....	.01
Shenandoah Con., Cal.	May 16	.....	.02

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
‡Anaconda Copper	May 19	.50	$600,000	$23,850,000
†Amalgamated Cop'r.	May 31	.50	769,430	24,273,276
Camp Bird, Colo.	May 7	.18	147,600	1,262,904
†Central Oil, W.Va.	May 2	.25	15,000	182,500
†Col.&Hock., C.&I.	May 15	.25	17,311	121,153
N.Y.& Hond. Rosario.	Apr. 23	.10	15,000	1,850,000
Oil City Petrol., Cal.	May 2	.00½	2,500	5,000
‡Penna. Steel, pf.	May 2	3.50	588,749	4,094,499
‡United Copper, pf.	May 2	3.00	150,000	600,000

• Monthly. † Quarterly. ‡ Semi-annually.
Note—Complete dividend-list will appear May 5.

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Apr.20 H.	Apr.20 L.	Apr.21 H.	Apr.21 L.	Apr.22 H.	Apr.22 L.	Apr.23 H.	Apr.23 L.	Apr.25 H.	Apr.25 L.	Apr.26 H.	Apr.26 L.	Sales
Acacia	$1													
Amalgamated, c.	100	49⅞	48¼	49¾	49¼	49⅝	49¼	49½	49⅝	49⅝	48½	48½	47⅞	50,490
Anaconda, c.	25	72	70¼							70¼				400
Anaconda, g.						13								500
Belcher, s.	3													
Best & Belcher, s.	3													
Breece, s. l.	25													
Bullion, s.	1													
Caledonia, s.	1	75								75				400
Chollar, s., g.	2½			25										300
Chrysolite, s. l.	50													
C. K. & N., g.	1			20						21				200
Confidence	3							1 05	1.00					200
Con.Cal.&Va., g.s.	2½	1.65		1.75		1.80	1.75	1.80		1.80		1.80		1,000
Con. Imperial, s.	1													
Creede & C. Ck., g.	1													
Cripple Creek, g.	1	.07				.08	.07			.08		.08		3,000
Crown Point	2½			26										300
Daly, g. s.	20													
Elkton, g.	1			66		67	66	67		67				1,550
El Paso, g	1									82				500
Gold Dollar, g.	1													
Gould & Curry	1													
Greene Con., c.	10	15¼	14½	15⅜	15⅛	15¼	15⅛	15½	15½	15⅞	15⅝	16	15⅝	15,520
Hale & Norcross	3	82	80							80				500
Homestake, g.	100			51⅜										10
Horn Silver	20									1.45				100
Isabella, g.	1									31	30			400
Julia, s.	1											7		500
Justice, s.	2											13		500
Little Chief, g. s.	50													
Mexican, s.	3					2.20						2.25		200
Mollie Gibson, g.	5			04		4½						4½		1,500
Moon Anchor, q.	5													
Occidental, s.	3									81	80			200
Old Gold, g.	1							10						1,000
Ontario, s. l.	100													
Ophir, s.	3	5.50				5.37½		5.50		5.50				500
Overman, s.	2													
Pharmacist, g.	1											4⅛		1,000
Phœnix, g.	1	11	10	10		10	9	11	10	11		11		10,800
Portland, g.	1	1.70						1.30				1.70		400
Potosi, s.	1	21				20				21				300
Quicksilver, Pf.	100							4.50						100
Savage, s.	3	44				45		43		42				1,000
Sierra Nevada, s.	3													
Silver Hill, g. s.	16													
StandardCon., g.s.	25			2.55		2.50								600
Tennessee, c.	1													
Union Con., g. s.	10													
Union Copper	100			5¼		5¼		5¼						600
United, com., c.		6½												10
Vindicator														
White Knob, c.	10							8				7⅞		120
Work, g.	1													
Yellow Jacket, s.	3													

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 94,430 shares *Holiday.

BOSTON, MASS.

Company.	Par val	Apr.20 H.	Apr.20 L.	Apr.21 H.	Apr.21 L.	Apr.22 H.	Apr.22 L.	Apr.23 H.	Apr.23 L.	Apr.25 H.	Apr.25 L.	Apr.26 H.	Apr.26 L.	Sales
AdventureCon., c	$25	2¼				2¼	2 1/16	2⅛		2 1/16	2	2		995
Allouez, c.	25	4¾	4⅞	4⅞	4⅝		4⅝		4⅝	4¾	4⅝	4 11/16		1,050
Amalgamated, c.	100	49¾	49¼	49⅝	49½	49⅝	49⅝	49½		49⅜	48⅛	48⅜	47⅝	10,150
Am. Z., L. & Sm.	25			13¾		10½				10½	9⅝			295
Anaconda, c. s.	25													
Arcadian, c.	25									40	35	35		85
Arnold, c.	25			25		25								100
Atlantic, c.	25	8¼	8											140
Bingham Con.	50	22	21½	21¾		22	21½	22		22	21¾	21½	21¼	3,310
Bonanza Dev. g.	10	40		40										1,000
British Col., c.	5													
Calumet & Hecla	25	469				469		462		465		4 65		17
Catalpa	10							5						200
Centennial, c.	25	19¾	19½	19¾	19½	19¼				19⅞	18¾	18¼	18½	1,194
†Central Oil	25					†7½		7½		7½				105
Con. Mercur, g.	5	41	39	45	35	40	33	34	30	34	33	37		8,713
Continental Zinc				11¾										20
Copper Range	100	42¾	42	42½	42	42⅜	41⅝	42¾	41¾	42¼	39¾	40¾	39¾	4,018
Crescent	10							3						100
Daly West, g. s. l	20	22	21½	22⅛	22	23	22½	24½	23	25	24¾	25	24¾	2,688
†Dominion Coal	100	61		63		64½	63	64						325
Preferred	100	108								111½	110¾	111½		61
Dominion I. & S.	100	10¼		10	9¾					10¾	10	10¼	10	505
Elm River, c.	12	2½		2⅜	2¼					2¼	2⅛	2¼		470
Franklin, c.	25	7½		8	7⅞	7⅞	7¾			7⅞				488
Granby Con.	10	3¾				3¾	3⅝	3⅝	3¾	3¾		3¾		2,822
Guanajuato Con.	5	1⅝	1½	2	1⅝	1⅞	1¾	1⅝		1⅞	1½	1⅞	1½	2,573
Isle Royal Con.	25	7				7¼								105
Mass Con., c.	25	4¼	4	4⅜		4				4 1/16	4	4		1,005
Mayflower, c.	25			60	50	50								190
Michigan, c.	25	5¼	5	5¼	5	4⅜				4½		4 1/16	4⅜	710
Mohawk, c.	25	42	41	41¼	41	41½	41	41½	41¼	41½	41	41	40½	1,007
Mont. Coal & C.	25											3⅝	3½	1,150
Mont'l & Boston	5													400
Napa, Cons., q.	7													
New Idria, q.	5	8¾												100
Old Colony, c.	25	1⅞	1	1¼	1⅛	1⅜	1	1				75 1		1,253
Old Dominion, c.	25	13	12⅜			13	12½	13¼	13	12¾	12½			680
Osceola, c.	25	57¾	57¼	57⅜	57	57¼	57⅛	57⅜	57	57	56	56	55½	770
Parrot, s. c.	10	24¾	24			24	23¾	24		23¾	23	23½		305
Phœnix Con, c.	25	1¾				1¾				1¾				335
Quincy, c.	25			82						85	83	82		43
Rhode Island, c.	25													
Santa Fe, g. c.	10			1⅝	1½	1⅝	1½	1⅝	1½	1½		1½		900
Shannon, c.	10	8½	8	8⅜						8½				394
Tamarack, c.	25					90				90				81
Tecumseh, c.	25													
Tennessee, c.	25													
Trinity, c.	25			4		4				4		3⅞		505
Union, c.	25													
United States, g.	10	20¼	20⅛	20½	20⅛	20¼	20	20⅛	20¼	20	19⅝	20	17⅝	3,436
U. S. Coal & Oil	25							9⅜	9½			9⅛	9⅜	241
Utah Con., g. c.	5	33¼	33⅛	33⅝	33⅜	34	33⅜	33⅓	33½	33¾	33	33⅛	33	2,090
Victoria, c.	25	3¼		3¼	3	3¼	3	3⅛		3		3		950
Winona, c.	25					6¼				6				100
Wolverine, c.	25			72		72	71½	72		72	71½	71	70½	152
Wyandot, c.	25			60										40

*Holiday. †Ex-dividend. ‡Assessment Paid. Total sales, 58,392 shares.
c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver.

Duluth, Minn.

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona	$10	$110	$111	Lake Sup. & Pitts Dev.	$10	$130	$135
Calumet & Bisbee	10	7.50	8.00	Pitts. & Duluth Dev.	15	50.00	51.00
Calumet & Cochise	10	7.50	8.00	Shakespeare			.20
Calumet & Pittsburg	10	33.50	35.00	United Mexican			.50
Higgins Development	10	3.00		Wolverine & Arizona	10	4.00	
Junction Development	15	14.00	14.50	Yaqui	10		1.50

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Apr.20 H.	Apr.20 L.	Apr.21 H.	Apr.21 L.	Apr.22 H.	Apr.22 L.	Apr.23 H.	Apr.23 L.	Apr. 25 H.	Apr. 25 L.	Apr.26 H.	Apr.26 L.	Sales
Allis-Chalmers	$100					6½								300
Preferred	100					40½	40	43						400
Am. Agr. Chem	100			13								13¼		100
Preferred	100													
Am. Sm. & Ref.	100	48¼	48			48¼				48¾	48⅜	48¾	48⅝	1,425
Preferred	100	93⅜		93⅜	93	93½	93	93⅛	93⅜			93¾	93⅜	2,721
Col. Fuel & I.	100			32	31							32⅛	31⅛	650
Preferred	10													
Col. & H. C. & I.	100	12½		13¼	13	13¼						13		535
†Crucible Steel	100	5½	4¾			5	4¾	5	4⅝	5		5		1,249
*Preferred	100	40¼	38¾	38	35	37½	36½	37¼	36¼	37	36⅜	36¼	35	5,765
General Chem.	100													
Preferred	100													
†Mong. R. Coal	50											8		25
*Preferred	100	26	25¾	25¾		25¾		2 3/4	25⅜			25¾	25⅜	529
National Lead	100	17⅛	17⅛							17		16⅝		410
Preferred	100	88½								89				100
*Phila. Nat. Gas	100	38½		38¾		39				39½	38¾			431
†Preferred	100													
*Pittsburg Coal	100			15¼				15¼		15⅜	15¼	15⅜	15¼	1,452
*Preferred	100	58¾	58½	58⅝	56			57		56⅛	56½	56⅜		1,310
Republic I. & S.	100			7		7	6⅞			6⅞		6¾	6⅝	2,825
Preferred	100	45⅛	45	44½	44¼			44⅛		43¾	42¼	42	41⅛	2,342
Sloss-Shef S. & I.	100			39¾										125
Preferred	100													
‡Standard Oil	100	625		624	622					622½		627	624	72
Tenn. C. I. & R. R.	100	38¼	37⅝	38	37½	38	37⅜	37½	37¼	37⅜	37	37¼	37	5,140
U.S. Red. & Ref.	100													
Preferred	100													
U.S.Steel Corp.	100	11	10¾	10⅛	10⅝	10⅛	10⅜	10⅛	10⅝	10⅜	10⅛	10⅝	10⅛	45,341
Preferred	100	58	58½	57⅜	56⅝	57½	56¾	5 3/4	56⅜	57	55⅝	56⅜	55½	377,735
Va.-Car Chem.	100			27	25¼	29	28	30	29	30½	29	28⅛	27½	4,440
Preferred	100			100¼	98	100¼	100½	100		101	100½	101	100⅝	1,765

*Pittsburg exchanges. †Holiday. ‡Ex. dividend. Total sales, 455,162.

COLORADO SPRINGS, COLO.

Company.	Par Val	Apr.16 H.	Apr.16 L.	Apr.18 H.	Apr.18 L.	Apr.19 H.	Apr.19 L.	Apr.20 H.	Apr.20 L.	Apr.21 H.	Apr.21 L.	Apr.22 H.	Apr.22 L.	Sales
Acacia	$1	.06¾	.06¼	.06⅝	.06¼	.06¼	.06⅛	.07	.06⅜	.07	.06¼	.06⅝	.06⅛	
American Con.	1													
Anaconda	5	12¾	12	13	11	12⅛	11¾	13	11	12¼	11¾	13	11¾	
Colo. City & M.	1	.02¾	.02¼	.03	.02⅝	.02¾		.03	.02¾	.03	.02¾	.03	.02¾	1,000
C. K. & N.	1	.26	.24	.26	.24	.25	.24	.27	.23	.24⅞	.24	.25	.24¾	9,000
Cripple Ck. Con.	1	.07⅜	.07¼	.07⅛	.07¼	.07⅜	.07¼	.08	.07⅜	.08⅜	.08¼	.08¼	.08	37,500
Des Moines	1	.02	.01¾	.02	.01⅝	.02	.01⅝	.02	.01⅜	.02	.01⅜	.02⅜	.02	2,000
Doctor Jack Pot.	1	.07	.06¼	.05	.04⅞	.05½	.04¾	.04½	.04⅜	.04⅝	.04⅜	.05⅛	.04⅞	73,800
Elkton Con.	1	.68½	.68	.68¾	.68½	.68¾	.68⅜	.68	.67	.67¼	.66½	.68	.67	6,832
El Paso	1	.79½	.79	.79¼	.79	.80	.79¼	.81	.80¼	.80¾	.80	.80½	.80	17,700
Gold Dollar Con.	1	.05¼	.05⅛	.05⅜	.05¼	.05¼	.05⅛	.05½	.05⅛	.05¼	.05⅛	.05⅝	.05½	22,150
Gold Sovereign	1	.04⅝	.04½	.05⅛	.05	.03⅛	.06	.06⅛	.06⅜	.06⅜	.06⅛	.06⅜	.06⅜	66,000
Golden Cycle	1	.50	.45	.50	.45	.50	.45	.50	.45	.50	.45	.50	.45	
Golden Fleece	1	.02		.02		.02		.02		.02		.02		
Hart	1	.03	.02	.01½		.01½		.03	.02½	.03	.02	.02		
Isabella new	1	.29	.28	.30	.28	.30	.28	.29½	.29	.29½	.28¾	.29½	.28½	1,250
Jack Pot	1	.09	.05	.09	.05	.09	.05	.09	.05	.09	.05	.09	.05	
Keystone	1	.03⅞	.03⅜	.04¼	.03¾	.04	.03¾	.05	.04	.05	.04	.04¼	.04	12,000
Last Dollar	1	.45		.45		.45		.45		.45		.45		
Lexington	1	.04¼	.04½	.04½	.04⅜	.04⅜	.04⅛	.04⅜	.04⅛	.04⅛	.04⅛	.04⅜	.04⅛	3,000
Little Puck	1	.03⅜	.03½	.03¼	.03⅛	.03⅛	.03⅜	.03¼	.03⅜	.03⅜	.03⅜	.03⅛	.03⅜	34,000
Mollie Gibson	1	.05½	.04½	.05½	.05	.05¼	.04⅝	.05¼	.04⅝	.05		.05½	.05	3,000
Moon-Anchor	5	.09	.07¾	.09	.07½	.09	.07½	.09½	.08¼	.09⅛	.08½	.09¼	.07⅛	1,000
New Haven	5	.03¼	.03	.03⅜	.03⅛	.04	.03⅛	.04	.03⅞	.04	.03	.03⅞	.03⅛	3,000
Old Gold	1	13	.11	13	11¼	11¾	11½	11⅞	.10¾	11	.10	11¼	.10¾	7,000
Pharmacist	1	.03¾	.03⅜	.03⅞	.03½	.03⅞	.03⅜	.03⅞	.03⅜	.04	.03¾	.04	.03¾	7,000
Pinnacle	1	.03½		.03¼		.03		.03		.03¼		.03¼		
Portland	1	1.75	1.70	1.80	1.70	1.80	1.70	1.75	1.69	1.73	1.67½	1.80	1.69	1,000
Vindicator Con.	1	75	70	.74	.69¼	.74		.75	.72	.75		.85	.73½	2,300
Work	1	.07¼	.07	.07¼	.07	.07¼	.07	.07¼	.07½	.07¾	.07½	.07¼	.06⅞	5,000

*Quotations not received. Total sales, 315,332 shares.

COLORADO SPRINGS (By Telegraph)

Company.	Apr. 25 H.	Apr. 25 L.	Apr. 26 H.	Apr. 26 L.
Anaconda	.13	.12	.13	.11
Cripple Ck Con.	.08¼	.08	.08½	.08¼
C. K. & N.	.25	.24½	.24⅜	.24⅜
Doctor-Jack Pot.	.05	.04½	.05	.04⅜
Elkton Con	.67	.66⅜	.67½	.67
El Paso	.83	.80¼	.82	.81½
Gold Dollar Con.	.05⅜	.05¼	.05⅜	.05½
Gold Sovereign	.06⅝	.06⅜	.06½	.06¾
Isabella	.29	.28	.29	.28¼

Company.	Apr. 25 H.	Apr. 25 L.	Apr. 26 H.	Apr. 26 L.
Jack Pot	.09	.05	.09	.05
Last Dollar	.40	.30	.40	.30
Mollie Gibson	.05¼	.05	.05½	.05½
Moon Anchor	.09	.08	.08¼	.08
Old Gold	.11⅛	.09	.11	.10
Pharmacist	.04	.03⅞	.04	.03¾
Portland	1.80	1.68	1.80	1.80
Vindicator	.80	.75	.76	.75
Work	.07½	.06⅞	.07	.06¾

SAN FRANCISCO.

Company.	Location.	Apr. 14 H.	Apr. 14 L.	Apr. 15 H.	Apr. 15 L.	Apr. 16 H.	Apr. 16 L.	Apr. 18 H.	Apr. 18 L.	Apr. 19 H.	Apr. 19 L.	Apr. 20 H.	Apr. 20 L.	Sales
Central Eureka	Cal	1.00								.08				670
Golconda	Ore.													
Golden Anchor	Nev.													
Hannapah	Nev.													
Lightner Mg. Co.	Nev.													
MacNamara	Nev.	.17	.16	.17	.16	.17	.15	.18	.17	.18		.19	.17	20,850
Mont, Tonopah	Nev.	1.65		1.42½	1.37½			1.42½	1.42	1.47½	1.42½	1.50	1.47½	8,798
Penna. C. M. Co.	Cal													
South Eureka	Cal													
Ton. Belmont	Nev.	.60		.59		.60	.59	.60	.59	.64	.70	.65		13,500
Ton. Midway	Cal			.37	.36	.36		.36		.37		.39	.38	10,550
Ton. Mg. Co.	Nev.	8.25		8.50										200
Ton. North Star	Nev.													
Ton. & Salt Lake	Nev.													
Ton. Superior	Nev.								.05					500
Wild Goose	Ala.													

San Francisco and Tonopah Mining Exchange.
Total sales, 55,168 shares.

SAN FRANCISCO (By Telegraph).

Company.	April 25.	April 26.
Belcher	32	31
Best & Belcher	1.90	1.85
Caledonia	.76	.73
Challenge Con.	.24	.23
Chollar	.24	.22
Confidence	1.09	1.00
Con. California & Virginia	1.75	1.70
Crown Point	.24	.23

Name of Company.	April 25.	April 26.
Gould & Curry	.29	.27
Hale & Norcross	.75	.75
Mexican	2.30	2.20
Ophir	5.62½	5.50
Overman	.38	.37
Sierra Nevada	.65	.58
Union Con.	.87	.82
Yellow Jacket	.22	.22

STOCK QUOTATIONS

MEXICO.* April 15

Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Durango:			
Ca. Min. de Penoles	2,500	$3,690	$3,800
San Andres de la Sierra	200	10,000	.....
Guanajuato:			
Angustias, Pozos	2,400	40	44
Cinco Senores y An., aviadoras	2,000	38	42
Cinco Senores y An., aviada	400	39	43
Providencia, San Juan de la Luz	6,000	68	73
Queensland y Australia	300	55	75
Guerrero:			
Delfina, 1st serie	2,500	50	54
Delfina, 2nd serie	2,500	35	40
Garduno y Anexas	7,200	30	40
Hidalgo:			
Amistad y Condordia	9,600	81	82
Carmen, aviada	1,100	50	90
Guadalupe Fresnillo Mill	1,000	170	200
Guadalupe Fresnillo Mine	1,400	70	80
La Blanca, aviadora	1,536	.....	.....
La Blanca, aviada	768	.....	.....
La Reina y An., aviadora	5,600	5	8
Luz de Maravillas, aviadas	1,100	.....	20
Maravillas y An., aviador	1,680	120	140
Maravillas el Lobo	1,000	130	180
Palma y An., aviador	1,800	8	16
Real del Monte	2,554	.....	.....
Refugio, aviada	12,800	680	740
Santa Anay An., aviadora	1,800	60	70
Santa Anay An., aviada	600	25	35
Sta. Gertrudis y An., aviadas	9,600	13	15
Sta. Gertrudis y An., aviadora	28,800	81	82
Santo Tomas Apostol aviadoras	5,100	2	3
San Felipe de Jesus, aviadora	3,600	21	23
San Felipe de Jesus, aviada	1,200	6	10
San Rafael y An., Trompillo	1,200	1,700	1,710
San Rafael y An., aviada	1,200	680	699
Soledad, aviada	670	675	690
Sorpresa, aviada	960	280	285
.....	.....	.....	.....

Name of Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Mexico:			
Alacran	2,400	20	28
Aldebarren	2,000	20	30
Buen Despacho	3,000	38	40
Dos Estrellas	3,000	1,875	1,925
La Esperanza (El Oro.)	3,000	1,500	1,500
La Reformia, aviadores	2,000	20	25
Providencia, pagadoras	1,600	.....	.....
Providencia, liberadas	900	.....	.....
Santa Ana, Esperanza	2,400	90	.....
Michoacan:			
Luz de Borda, aviadora	3,000	40	45
Luz de Borda, aviado	1,000	25	33
Santiago y An., Tlal	4,000	4	6
Nuevo Leon:			
La Fraternal	1,000	580	620
Norias de Bajan	1,000	880	920
San Luis Potosi:			
Concepcion y An	3,000	63	65
El Barreno, aviadora	2,000	70	75
Sta. Maria de la Paz	9,600	190	195
San Diegoy Annexas	2,400	8	10
Zacatecas:			
Asturiana y An	2,500	20	30
Candelaria y Pinos	2,500	130	140
Cubiertas	2,400	.....	.....
Esperanza y An	2,400	6	8
Lourdes	2,500	22	27
Luz de Minillas, pagadoras	2,000	15	30
Nueva Quebradilla, aviadoras	2,400	20	40
Nueva Quebradilla, aviadas	600	20	40
San Carlos y Annexas	2,500	60	65
Sta. Maria de Gaud	2,500	55	60
Miscellaneous:			
Bartolome de Medina	2,000	80	84
Guadalupe Hacienda	20,000	.....	.....
La Luz Hac. (Pachuca.)	3,750	.....	.....
La Reina (Chihuahua.)	192	.....	.....
Naica (Chihuahua.)	100	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	950	100
Natividad (Oaxaca) aviadas	600	.....	.....
San Francisco Hac	6,000	70	75
Santa Ana Huantla Morelos	4,000	.....	.....
Union Hacienda	3,000	220	240

*Values are in Mexican currency.

TORONTO, ONT. April 23

Company.	Par val	Prices. High.	Prices. Low.	Sales
Black Tail, g	$1	.....	.....	.....
Cariboo-McKin	1	.....	.....	.....
Cariboo-Hydr	1	.....	.....	.....
Center Star, g. s	1	.30	.25	.....
Crows Nest, C.C	100	.....	.....	.....
Dominion Coal	100	.....	.....	.....
Dominion S. & I.	100	.....	.....	.....
Fairview, g. s	1	.....	.....	.....
Giant, g. s	1	.....	.....	.....
Deer Trail, g. s	1	.....	.....	.....
Iron Mask, g. s	1	.....	.....	.....
Morrison, g. s	1	.....	.....	.....

Company.	Par val	Prices. High.	Prices. Low.	Sales
Granby Smelter	$10	.....	.....	.....
Mountain Lion, g.	1	.....	.....	.....
North Star, g. s	1	.....	.....	.....
Nova Scotia Steel	100	.....	.....	.....
Payne, s. l	1	.13	.07	.....
Rambler Carib	1	.29	.20	.....
Republic, g	1	.....	.....	.....
St. Eugene, g. s	1	.50	.43	.....
Virtue, g. s	1	.....	.....	.....
War Eagle Con	1	.14	.09	.....
White Bear	1	.....	.....	.....
Winnipeg, g. s	1	.....	.....	.....
Wonderful, g. s	1	.....	.....	.....

g—Gold. l—Lead. s—Silver. Total sales, none.

SALT LAKE CITY.* April 23

Company	Par Val	High	Low	Sales.
Ajax	10	.12	.11½	1,000
Bullion-Beck	...	...	...	...
Butler Liberal	....	.12½	.12	4,200
Carisa	...	.05	.02½	3,100
Century	1	.75	.73½	300
Con. Mercur	1	.45	.32	7,000
Daly	20	2.30	2.30	140
Daly-Judge	....	4 10	4.10	100
Daly West	½	23.00	21.75	445
Grand Central	....	4.50	4.43	1,800
Little Chief	....	01½	.01½	3,000
Ingot	1	¾	⅛	11,100
La Reine	....	.04½	.04½	2,180
.....	.....	.....	.....	.....

Name of Company	Par Val	High	Low	Sales.
L. Mammoth	⅛	.29½	.28	2,400
Mammoth	...	...	...	...
May Day	...	...	...	...
Martha Wash	....	.01¼	.01½	15,000
N. Y. Bonanza	5	.15	.13	9,100
Ontario	....	3.85	3.85	50
Sacramento	....	.17	.11½	5,500
Silver Shield	1	.03	.02½	1,500
So. Swansea	....	.06	.05	100
Star Con	....	.18½	.15¼	4,700
Tetro	....	.28	.24	9,100
Uncle Sam, Con	1	.20	.19	1,000
Wabash	....	.....	.....	.....
Victor Con	....	.....	.....	.....

*By our Special Correspondent. All mines are in Utah. Total sales, 83,795 shares.

PHILADELPHIA, PA

Company.	Par val.	Apr. 20 H.	Apr. 20 L.	Apr. 21 H.	Apr. 21 L.	Apr. 22 H.	Apr. 22 L.	Apr. 23 H.	Apr. 23 L.	Apr. 25 H.	Apr. 25 L.	Apr. 26 H.	Apr. 26 L.	Sales
Am. Cement	$10	.....	.....	7¾	.....	7⅛	.....	.....	.....	.....	.....	.....	.....	182
Cambria Iron	50	.....	.....	.....	.....	46¼	46	.....	.....	.....	.....	.....	.....	19
Cambria Steel	50	20⅛	20	20¼	.....	20⅜	20½	.....	.....	20¼	20	20	.....	2,520
Pa. Steel, pfd	100	.....	.....	.....	.....	.....	.....	.....	.....	80	.....	.....	.....	10
Susq. I & S.	5	.....	.....	.....	.....	¾	⅝	.....	.....	.....	.....	.....	.....	40
United Gas I.	50	83½	83	83¼	83	83¾	83½	83⅛	.....	83¾	83½	83¼	83	756
Lehigh Nav'n	50	69	.....	69	.....	70	69	71¼	.....	72½	77	74	.....	1,374
Philadelphia	50	38⅛	3-¼	38⅛	.....	39	38⅛	39⅛	.....	39	3-¾	.....	.....	1,605
U.S. Steel	100	11⅛	10¾	10⅞	10¾	10¾	10⅝	.....	.....	10¾	10⅝	10¾	10½	3,460
*U.S. Steel, pf.	100	58	54⅛	51½	56⅝	57¼	53⅝	56⅝	57 ¼	56⅞	55¾	56⅝	55⅝	11,708

*Ex-dividend. Total sales 21,979.

LONDON. April 15

Company.	Shares Issued.	Par value. £. s. d.	Latest dividend. Amt. s. d.	Latest dividend. Date.	Quotations. Buyers. £. s. d.	Quotations. Sellers. £. s. d.
American:						
Alaska-Treadwell	200,000	5 0 0	3 0	Apr., 1904	4 11 3	4 13 9
Anaconda	1,200,000	5 0 0	2 0	Nov., 1903	3 13 9	3 16 3
Camp Bird	820,000	1 0 0	9	May, 1904	1 5 0	1 6 3
Copiapo	112,500	2 0 0	6 10	May, 1903	1 0 0	1 5 0
De Lamar	90,000	1 0 0	2 0	Oct., 1903	12 6	15 0
El Oro	1,080,000	1 0 0	9	Jan., 1904	1 4	1 3 9
Frontino & Bolivia	128,682	1 0 0	3 0	July, 1901	7 6	10 0
Le Roi	200,000	5 0 0	5 0	Nov., 1899	1 10 0	1 12 6
Le Roi No. 2	120,000	5 0 0	1 0	Feb., 1904	17 6	1 0 0
Montana	657,128	1 0 0	6	April, 1899	9	1 0
Palmarego & Mexican	445,000	1 0 0	rts.	April, 1903	7 3	7 9
Standard	500,000	4 0	2½	Sept., 1903	2 0	3 0
Stratton Independence	1,000,007	1 0 0	6	Dec., 1903	4 3	4 9
St. John del Rey	548,285	1 0 0	6	Dec., 1903	13 6	14 6
Tomboy	300,000	1 0 0	1 0	June, 1902	1 5 0	1 10 0
Ymir	200,000	1 0 0	1 0	Mar., 1902	2 6	5 0
European:						
Linares	15,000	3 0 0	5 0	Apr., 1904	3 15 0	4 5 0
Mason & Barry	185,172	1 0 0	7 0	May, 1904	3 17 6	4 2 6
Rio Tinto	325,000	5 0 0	37 6	Apr., 1904	53 2 6	53 7 6
Rio Tinto, preferred	325,000	5 0 0	2 6	Apr., 1904	6 0 0	6 5 0
Tharsis	625,000	2 0 0	7 0	May, 1904	4 12 6	4 17 6
West Australian:						
Associated	495,388	1 0 0	2 0	Jan., 1904	2 17 6	3 0 0
Cosmopolitan	400,000	1 0 0	1 0	May, 1903	12 6	13 6
Golden Horseshoe	300,000	5 0 0	6 0	Apr., 1904	8 6 3	8 8 9
Great Boulder	1,750,000	2 0	9	Mar., 1904	1 7 3	1 7 9
Gt. Boulder Persever'ce	1,480,007	1 0 0	1 3	Feb., 1904	1 4 0	1 4 6
*Great Fingall	250,000	1 0 0	7 0	Apr., 1904	8 6 3	8 8 9
Ivanhoe	200,000	5 0 0	7 6	Apr., 1904	8 11 3	8 13 9
*Kalgurli	120,000	1 0 0	2 6	Apr., 1904	5 12 6	5 15 0
Lake View	250,000	1 0 0	rts.	Aug., 1902	1 5 0	1 7 6
Oroya-Brownhill	450,000	1 0 0	2 6	Mar., 1904	3 7 6	3 8 9
Miscellaneous:						
Brilliant Central	100,000	1 0 0	1 0	Apr., 1904	2 17 6	3 2 6
Briseis	600,000	1 0 0	... ...	.....	9 0	10 0
Broken Hill	900,000	8 0	1 6	Feb., 1904	1 14 0	1 15 0
Mt. Lyell	275,000	3 0 0	4 3	Sept., 1903	19 6	1 0 6
*Mt. Morgan	1,000,000	1 0 0	3	Apr., 1904	2 5 0	2 10 0
Waihi	497,412	1 0 0	2 6	Mar., 1904	5 12 6	5 15 0
Indian:						
Champion Reef	513,832	10 0	1 3	May., 1904	1 15 6	1 16 6
Mysore	500,043	10 0	5 6	Mar., 1904	6 7 6	6 10 0
Nundydroog	484,000	10 0	1 8	Mar., 1904	1 16 3	1 18 9
Ooregum	343,000	10 0	1 3	Apr., 1904	1 0 0	1 2 6
Ooregum, pfd	240,000	10 0	1 3	Apr., 1904	1 8 9	1 11 3
South African:						
Angelo	600,000	1 0 0	4 0	Feb., 1904	6 12 6	6 17 6
Bonanza	200,000	1 0 0	10 0	Feb., 1904	1 11 3	1 13 9
British South Africa	4,436,019	1 0 0	rts.	May, 1899	2 2 6	2 3 9
Cape Copper	300,000	2 0 0	4 0	Jan., 1904	3 0 0	3 5 0
Cape Copper, pfd	75,000	2 0 0	1 9	Jan., 1904	2 15 0	3 0 0
City & Suburban	340,000	4 0 0	8 0	Feb., 1904	6 15 0	6 17 6
Consol. Gold-Fields	2,000,000	1 0 0	... ...	.....	6 13 9	6 15 0
Crown Reef	120,000	1 8 0	18 0	Apr., 1904	16 15 0	17 5 0
De Beers, preferred	800,000	2 10 0	10 0	Jan., 1904	18 13 9	18 18 9
De Beers, deferred	1,000,000	2 10 0	15 0	Jan., 1904	19 12 6	19 15 0
East Rand	930,000	1 0 0	5 0	Aug., 1903	7 12 6	7 13 9
Ferreira	90,000	1 0 0	3 0	May, 1904	20 15 0	21 5 0
Geldenhuis	200,000	1 0 0	6 0	Feb., 1904	5 12 6	5 15 0
Geduld	400,000	1 0 0	rts.	Mar., 1902	6 12 6	6 15 0
Henry Nourse	125,000	1 0 0	10 0	Feb., 1904	8 17 6	9 2 6
Jubilee	50,000	1 0 0	5 0	Feb., 1904	4 15 0	5 0 0
Jumpers	100,000	1 0 0	2 6	May, 1904	3 5 0	3 10 0
Langlaagte	470,000	1 0 0	2 6	Feb., 1904	3 15 0	3 17 6
May	288,750	1 0 0	3 6	Feb., 1904	4 3 9	4 6 3
Meyer & Charlton	100,000	1 0 0	5 0	Jan., 1904	5 7 6	5 12 6
Modderfontein	200,000	1 0 0	rts.	Apr., 1902	9 6 3	9 8 9
Namaqua	94,331	2 0 0	3 0	Dec., 1903	3 5 0	3 10 0
New Jagersfontein	200,000	5 0 0	10 0	Apr., 1904	28 5 0	28 15 0
New Primrose	325,000	1 0 0	3 0	Mar., 1904	3 18 9	4 0 0
Rand	1,786,956	5 0	4 0	Aug., 1902	10 7 6	10 8 9
Robinson	750,000	5 0 0	5 6	Feb., 1904	9 17 6	10 2 6
Robinson Deep	950,000	1 0 0	3 0	Jan., 1904	5 11 3	5 13 9
Rose Deep	425,000	1 0 0	2 6	Feb., 1904	8 10 0	8 15 0
Salisbury	100,000	1 0 0	2 6	Apr., 1904	2 2 6	2 5 0
Village	400,000	1 0 0	3 0	Feb., 1904	7 3 9	7 6 3
Wemmer	80,000	1 0 0	10 0	Jan., 1904	10 17 6	11 2 6

*Ex-dividend.

LONDON (By Cable.)*

Company.	Apr. 20 £.	Apr. 20 s.	Apr. 20 d.	Apr. 27 £.	Apr. 27 s.	Apr. 27 d.
Anaconda	3	15	0	3	17	6
British So. Africa	2	1	3	2	3	9
Camp Bird	1	6	0	1	6	0
Con. Gold Fields	6	11	3	6	17	6
De Beers	19	12	6	19	7	6
East Rand	7	11	10½	7	16	3

Company.	Apr. 20 £.	Apr. 20 s.	Apr. 20 d.	Apr. 27 £.	Apr. 27 s.	Apr. 27 d.
El Oro	1	2	6	1	3	9
Modderfontein	9	5	7½	5	12	6
Rand Mines	10	6	3	10	13	9
Rio Tinto	52	15	0	54	0	0
Simmer & Jack	1	15	7½	1	15	7½
Tomboy	1	7	6	1	7	6

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. April 7

Company.	Location.	Capital Stock. Francs.	Par value. Fr.	Latest divs. Fr.	Prices. Opening. Fr.	Prices. Closing. Fr.
Anzin, Coal	France	.....	.....	290.00	5,410.00	5,410.00
Boleo, c	Lower Cal	12,000,000	500	62.50	1,880.00	1,870.00
Champ d'Or, g	S. Africa	3,375,000	25	3.75	18.50	18.50
Courrieres, Coal	France	600,000	500	110.00	2,725.00	2,750.00
Fraser River, g	Brit. Col	250,000	25	.....	5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	80.75	84.50
Laurium, z. l	Greece	16,300,000	500	25.00	317.00	317.00
Malfidano, z	Italy	12,500,000	500	50.00	590.00	585.00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	489.00	489.00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	860.00	860.00
Nickel, n	N. Caledonia	15,000,000	250	22.50	535.00	547.00
Penarroya, Coal	Spain	.....	500	45.00	1,084.00	1,088.00
Vielle Montagne z	Belgium	9,000,000	30	30.00	693.00	700.00
.....	.....	.....	.....	.....	.....	.....

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

ST. LOUIS, MO.* April 23

Name.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo	$10	$0.15	$0.25
Catherine Lead, Mo.	10	1.40	2.50
Central Coal & C	100	60.00	62.00
Central C. & C., pf	100	71.00	72.00
Central Lead, Mo	100	110.00	115.00

Name.	Par Val.	Prices. Bid.	Prices. Ask.
Columbia Lead, Mo.	$10	$3.50	$4.50
Con. Coal, Ill	100	17.00	18.00
Doe Run Lead Mo.	100	110.00	115.00
Granite Bimet. Mt.	10	.35	.40
St. Joe Lead, Mo.	10	15 00	16.00

*By our Special Correspondent.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort,	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, Powd.,	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.: Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h.gr.	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10½@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal	2.47@2.49
Refined wood, 95@97%.	"	.50@.55
Purified.	"	1.25@1.30
ALUM—Lump	100 lbs.	1.70
Ground	"	1.80
Porous	"	1.00
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08¼
Muriate gram.	"	.05⅝
Lump	"	.09¼
Nitrate, white pure (98%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¾
Oxide, com'l white, 95%	"	.03½
Com'l white, 98%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.03½@.03¼
Red	"	.06⅜@.06½
ASPHALTUM—		
Barbadoes	"	.02½@.03
Ventura, Cal.	sh. ton	32.00
Cuban	lb.	.01¼@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh. ton	35.00
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	sh. ton	21 00
Gilsonite, Utah, ordin'y	lb.	.03
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh. ton	$25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100 lbs.	1.65 @1.70
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05¾
Sulphate (Blanc Fixe)	lb.	$0.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2.	"	8.00
Crude, No. 3	"	7.00
Snow-flake	"	18.00
Foreign gray	"	13.50
Snow white	"	17.25
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines: First grade	lg. ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03⅛
"A"	"	.05
BONE ASH	"	.02¼@.02½
BORAX	"	.07¼@.07½
BROMIDE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.45
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.45@1.60
Foreign	"	1.75@2.25
"Rosendale," 300 lbs.	"	.80
Slag cement,	"	1.25@1.50
CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14
CHALK—Lump, bulk.	sh. ton	3.00
Ppt. per quality	lb.	.04@.05¼
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE— (50% cb.) ex-ship N. Y.	lg. ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINE—Am. com., exdock, N. Y.	lg. ton	8.25
Am. best, ex-dock, N. Y	"	9.25
English, common	"	10.75
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lbs.	.47½
In bbls.	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.12⅜@.12¾
FELDSPAR—Ground	sh. ton	@10.00
FLINT PEBBLES—Danish. Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR— Lump	sh. ton	8.00@10.00
Ground	"	11.50@13.50
FULLER'S EARTH—Lump	100 lbs.	$0.80
Powdered	"	.85
GRAPHITE—Am. f.o.b. Providence, R.I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
German, com. pulv	lb.	.01¼@.01⅛
Best pulverized	"	.01⅛@.02
Ceylon, common pulv	"	.02¾@.03⅛
Best pulverized	"	.04@.08
Italian, pulverized	"	.01¼
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Ground. American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l.	"	.01¼
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	lb.	.08⅛ @ .8¾
Brown	"	.06½@.06¾
Nitrate, com'l	"	.06½
" gran	"	.08¼
LIME—Com., abt. 250 lbs	bbl.	.80
Finishing	"	1.00
MAGNESITE—Greece. Crude (95%)	lg. ton	5.00@5.50
Calcined	sh. ton	15.50
Bricks, best imp., f.o.b. N.Y.	M.	155.00
Bricks, domes., per qual., f.o.b. Pittsburg	"	160.00@200.00
MAGNESIUM— Carbonate, light, fine pd	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs	.75@.95
MANGANESE— Crude powd. 70@75% binoxide	lb.	.01¼@.01½
75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05¼
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.18@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse	sh. ton	33.00@38.00
Fine	lb.	.00⅞@.02
Sheets are sold as to size and quality		
MINERAL WOOL— Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1.	lb.	1.00
No. 2.	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr. 25@30, cold test	gal.	.13@.13¾
15, cold test	"	.13¾@.14¼
Zero	"	.18¼@.19¼
Summer	"	.12¾@.13¼
Cylinder, dark steam ref	"	.14¼@.16¼
Dark, filtered	"	.18¼@.19¼
Light, filtered	"	.20¼@.21¼
Extra cold test	"	.24¾@.31¾
Gasoline, 86 @90°	"	.17@.22
Naphtha, crude, 68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw.	"	.39@.42
Boiled	"	.44
Calcutta, raw	"	.65
OZOKERITE	lb.	.11½
PAINTS AND COLORS— Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	10¾
Best	"	.14
Lampblack, com'l.	"	.04½
Refined	"	.07
Litharge, Am. pow'd.	"	.05¼@.05¾
English Glassmakers'.	"	.08½@.08⅝
Metallic, brown	sh. ton	19.00
Red	"	16 00
Ocher, Am. common	"	8.50@9.00
Best	"	21.25@25.00
Dutch, washed	lb.	.02¼
French, washed	"	.01¼@.01⅞
Orange mineral, Am.	"	.07⅜@.07¾
Foreign, as to make	"	.08½@.10¼
Paris green, pure, bulk	"	.11
PAINTS AND COLORS— Red lead, American	lb	$0.06¼@$0.06½
Foreign	"	.07@.08¼
Turpentine, spirits	gal.	.58½
White lead, Am., dry	lb.	.04¾@.05
American, in oil	"	.05¾@.06½
Foreign, in oil	"	.09 @.09⅛
Zinc, white, Am., ex. dry	"	.04⅜@.04¾
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06¼@.09½
POTASH— Caustic, ordinary	"	.04½@.04¾
Elect. (90%)	"	.06¼
POTASSIUM— Bicarbonate cryst	"	.08¼
Powdered or gran	"	.14
Bichromate, Am.	"	.08¼@.08¾
Scotch	"	.08⅝@.08¾
Bromide	"	@.30
Carbonate (80@85%)	"	3 75@4.00
Chlorate, powdered	"	.06¾@.07¼
Crystals	"	.06½@.07
Chromate	"	.35
Cyanide (98@99%)	"	.19 @.20
Kainit	lg. ton	9.30
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09¼@.09½
Prussiate, yellow	"	.14¾@.14⅞
Red	"	.36 @.36¾
Sulphate, 90%	100 lbs	2.11
96%	"	2.14
Sylvanit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine 280 lbs.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lbs	3.50
Refined	"	4.00@4 50
SILICA— Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.34½
Oxide	"	.85@1.10
SODIUM— Bicarb., ord., bulk f.o.b. works	100 lbs.	1.30
Extra domes., f. o. b. works	"	3.50
Bichromate	lb.	.06⅜
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.80
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 70@76%, f. o. b. works	"	1.75@1.90
Foreign, f.o.b N. Y.	"	1.90@1.95
Chlorate, com'l	"	.06¾@.07
Hyposulphite, Am.	"	1.60@1.65
German	"	1.70@1.90
Nitrate, spot and nearby	"	2.25@2.35
Shipments	"	2.12½@2.15
Peroxide	lb.	.45
Phosphate	"	.02½@.02¾
Prussiate	"	.09⅝
Sal soda, f.o.b. works	100 lbs.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lbs.	.82½
Sulphide, crystals, bbl.	lb.	.01⅛
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	2.10
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade.	sh. ton	20.00
N. Y., Fibrous, best	"	10.25
French, best	100 lbs.	2.50
Italian, best	"	2.25
TAR—Regular	bbl.	2.25
Oil, bbl	"	5.75
TIN—Crystals, bbl.	lb.	.21
Oxide	"	.35
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@09⅝
Carbonate, ppt.	"	.09
Chloride solution, com'l	"	.02¼
Chloride granular	"	.04¾@.04⅝
Dust	"	.05¼@.05⅞
Sulphate	"	.02 @.02¼

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07⅞@.08¼
THORIUM—Nitrate 49@50%.	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.